The UMA Group

REPORT
ON
TOWN OF DUNDAS
SEWAGE COLLECTION SYSTEM
&
SEWAGE TREATMENT PLANT

SEPTEMBER 1973

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UMA Underwood McLellan & Associates Limited
89 Carlingview Drive, Rexdale (Toronto), Ontario M9W 5E4 Telephone (416) 677-6651

OUR FILE NO.

September 20, 1973

Mr. G.A. Corner,
Town Administrator,
Town of Dundas,
Main Street
Dundas,
Ontario.

Dear Sir:

Re: Pre-Design Report on Sewerage
Works for the Town of Dundas
Project #1666-001

We have now completed the report on the Pre-Design Phase of the project, in accordance with the terms of reference set out in our agreement and, as per your request, we are pleased to enclose thirteen copies of same.

Due to late delivery of equipment necessary for the plant scale nutrient study, the report has been completed without full benefit of the study results. However, it is anticipated that final results of said study will not significantly affect the conclusions and recommendations contained in this submission.

Following a review of this report by your staff and Council, we will be pleased to meet with your Council and other municipal representatives to answer any questions and discuss the implementation of the project.

Yours very truly,

UNDERWOOD McLELLAN & ASSOCIATES LIMITED

M. Bruno, P. Eng.,
Manager - Eastern Region.

MB:rl
Encl

ENGINEERING AND PLANNING CONSULTANTS

INDEX

1) Introduction

2) Summary and Recommendations

3) Sewage Treatment Plant Outfall Sewer

4) Sewage Pumping Stations

General

1 King and East Streets Sewage Pumping Station
2 Hillyard Street Sewage Pumping Station
3 Hope Street Station
4 Sleepy Hollow Sewage Pumping Station
5 University Garden Sewage Pumping Station
6 Dundanna Terrace Sewage Pumping Station
7 Creighton Road Sewage Pumping Station
8 Hillside Sewage Pumping Station

5) Sanitary Sewer System

General

1 South Easterly Area
2 South Central Area
3 South West Area
4 West Central Area
5 North West Area
6 North East Aaea

6) Industrial Waste By-Law and Plumbing

7) Sewage Treatment Plant

General

1 Chemical-Physical Treatment Process
2 Extended Aeration Activated Sludge Process
3 Modified High Rate Activated Sludge Process
4 Unox - Union Carbide Activated Sludge Process
5 Conventional Activated Sludge Process

8) Construction Timing and Cost Estimates

APPENDICES

A - Detailed Description of Sewage Pumping Station and sketchs of Station Layouts

1 King and East Streets Sewage Pumping Station
2 Hillyard Street Sewage Pumping Station

3 Hope Street Station
4 Sleepy Hollow Sewage Pumping Station
5 University Garden Sewage Pumping Station
6 Dundanna Terrace Sewage Pumping Station
7 Creighton Road Sewage Pumping Station
8 Hillside Sewage Pumping Station

B - Industrial Waste By-Law

C - Design Parameters For Proposed Conventional Activated Sludge Process

D - General Plan of the Sewage Collection System

E - Sewage Treatment Plant and Outfall Sewer Plan

REPORT

ON

TOWN OF DUNDAS

SEWAGE COLLECTION SYSTEM

&

SEWAGE TREATMENT PLANT

PREPARED BY

UNDERWOOD MCLELLAN AND ASSOCIATES LIMITED

89 CARLINGVIEW DRIVE

REXDALE, ONTARIO

SEPTEMBER 1973

INTRODUCTION

INTRODUCTION:

In November 1972, the Municipal Corporation of the Town of Dundas authorized Underwood McLellan & Associates Limited to carry out various assignments in connection with the Town's sewage works. These included the following:

(1) An evaluation of the existing sewage treatment plant involving a Treatability Study in accordance with the standards established by the Ministry of the Environment. This work was completed with the submission of a report to the Client entitled Treatability Study for Phosphorous Removal dated January 1973.

(2) A Pilot Plant Study which was commenced in August 1973 and is expected to be completed with the submission of a separate report in November 1973.

(3) A Pre-Design Study including the following terms of reference:
   (a) Investigate routes for the proposed new outfall sewer.
   (b) Review operation of the Client's existing sewage pumping stations.

(c) Review, in general, the existing sewage collection system, including the operation of existing syphons.

(d) Review the Client's existing waste by-law.

(e) Utilizing the data and information obtained during the Evaluation Phase and the Pilot Plant Study, assess the scope and extent of the proposed plant expansion.

(f) Prepare preliminary flow sheets and drawings indicating the proposed plant expansion.

(g) Prepare preliminary capital cost estimates for the proposed plant expansion broken down into component costs.

(h) Prepare an outline schedule of the proposed design and construction program.

(i) Prepare and submit to the Client 10 copies of a Final Report summarizing the results of the studies carried out during the Evaluation Phase and the investigations conducted during the Pre-Design Phase and including recommendations to the Client regarding the Project.

This report relates to the Pre-Design Study and deals with the individual items covered in the same order in which they are listed in the above noted terms of reference.

The willing assistance by various staff members of the Town of Dundas is acknowledged. In particular, we wish to thank Mr. P.J.W. Morris, P. Eng., Town Engineer, Mr. G.A. Corner, Town Administrator, Mr. R. Robertshaw, Engineering Technologist, and Mr. A. Youell, Plant Superintendent.

SUMMARY AND RECOMMENDATIONS

SUMMARY AND RECOMMENDATIONS:

The report reviews the alternative locations for the sewage treatment plant outfall sewer along the Desjardins Canal into Cootes Paradise for a total length of 3,000 feet beyond the present outlet. The alternative locations considered include the construction of the outlet pipe in the canal. However, it has been concluded that the most suitable location for the outfall sewer is along the north bank of the canal and the total estimated cost of this project is $299,700.00, including engineering and contingencies.

There are eight sewage pumping stations in the Town of Dundas. All stations require improvements in order to be considered satisfactory for the present development. While new or additional equipment has been recommended for installation at six of the stations, it is recommended that two stations be completely rebuilt. These are the Hillyard Street and the Hope Street Stations. The major equipment items required at each station includes the provision of a second pump and facilities for standby power. It is recommended that stationary standby power units be provided at the King and East Streets Station, the Hope Street Station, the Creighton Road Station and the Hillside Station. The remaining stations could be

adequately served by a portable generator unit. The study indicates that it may be possible to eliminate the Hope Street Station by constructing a sanitary sewer with outlet to the Main Street sewer at Spencer Creek.

The sanitary sewer system in the Town of Dundas can be divided into five districts. Significantly, the most troublesome districts, with respect to sewage back-up into basements, are in the areas not provided with storm sewers. The connection of downspouts from eavestroughs to the sanitary sewer system is suspected to be the major cause of these problems. It is recommended that a thorough survey be conducted, that all illegal connections to the sanitary sewer system be removed, and that the home owners be encouraged to provide concrete splash pads at each downspout. It is further recommended that additional development or redevelopment of existing built up areas to more intensive land uses be permitted only after a thorough review of the remaining capacity in the sanitary sewer system, since it appears that many portions of the system are approaching hydraulic capacity.

The industrial waste by-law now in force was reviewed and found to be satisfactory. The report discusses briefly

corrective measures that, if not now in force, should be applied with respect to plumbing. These measures include conversion of plumbing works to comply with the "Plumbing Regulations" and the provision of splash pads on downspouts, before the issuance of permits for building improvements.

Expansion of the sewage treatment plant to provide a treatment capacity of 4.0 mgd, together with nutrient removal facilities, has been reviewed. It is recommended that a conventional activated sludge plant extension be constructed. The proposed plant expansion encroaches on the parking area at the "Ball Diamond". This is due to site constraints and the proximity of existing homes, which leave no alternative options. The existing treatment plant settling tanks must be down rated to 1.5 mgd due to the use of aluminum sulphate for phosphorus removal. Accordingly, the proposed plant expansion must be sized for 2.5 mgd to obtain a total treatment capacity of 4.0 mgd. The existing sludge handling facilities should not be expanded at this time, but their adequacy should be assessed after the plant expansion has been constructed and operated for some time. This will permit the determination of the most appropriate system for sludge treatment following the provision of nutrient removal at the plant. The total estimated cost of

the recommended plant expansion (exclusive of the outfall sewer) is $1,249,300, including engineering and contingencies. Due to the nature of the work and the presence of a high water table, construction of the project should be scheduled to avoid winter conditions. Accordingly, to commence construction in the spring of 1974 and complete the project the following summer, detailed design should be authorized to commence not later than early December 1973. This construction timing would also be the most suitable for the outfall sewer.

Separate projects for the improvement of sewage pumping stations and detailed surveys of the sewage collection system could be initiated at any time convenient to the Town. However, the Hope Street, Hillyard Street and King and East Streets pumping stations should receive early attention.

SEWAGE TREATMENT PLANT OUTFALL SEWER

SEWAGE TREATMENT PLANT OUTFALL SEWER:

The outfall sewer from the plant presently terminates at the north bank of the Desjardins Canal, approximately 600 feet east of the plant. The canal banks extend approximately another 2,800 feet easterly to Cootes Paradise. The Ministry of the Environment requires that the outfall be extended approximately 200 feet into Cootes Paradise, for a total length of about 3,000 feet. This extension is required by the Ministry before consideration will be given to an expansion of the present sewerage system.

The area for construction is difficult due to the presence of a high water table and 4 to 8 feet of loose muck in the canal and Cootes Paradise. For these reasons, we envisage constructing the proposed outfall sewer extension on land as far as possible and in a trench excavated below the muck for the rest of the way, as shown in Appendix 'E'. We also envisage the use of flexible pipe material, such as polyethylene, to facilitate construction and minimize possible settlement problems.

The existing 30" diameter outfall pipe has a maximum capacity of approximately 13 mgd. The required capacity for

the extended plant is 12 mgd. The recommended 36" diameter pipe extension is sized for this capacity and to permit a further extension of the outfall for an additional 1,000 feet, beyond the subject 3,000 foot extension, (to locate the outlet opposite the mouth of Spencer Creek), should this be a future requirement. The additional size required to accommodate a possible second extension is only one pipe size greater than that required without the second extension and the resulting cost difference is only nominal. It should be noted that, since the pipe will be constructed on a flat gradient and it will be completely surcharged, there is a limit to which the outfall can be extended and this is set by the size of the pipe and the elevation of the existing plant.

SEWAGE PUMPING STATIONS

SEWAGE PUMPING STATIONS:

General:

All eight sewage pumping stations existing in the Town of Dundas sewage collection system have been inspected and the following sections set out our findings and recommendations.

It is noted that the requirements for a sewage pumping station, as established by the Ministry of the Environment, are now more stringent than in the past. Except for the Creighton Road, Dundanna Terrace and Hillyard sewage pumping stations, all have been constructed prior to 1960.

Several stations are completely below grade. This and site limitations will make it difficult to provide some of them with stationary standby power. However, in some cases, it is suggested that a portable standby power unit be used by the Town Works Department, in lieu of stationary standby power units.

Except for the Dundanna Terrace and the King and East Street sewage pumping stations, all stations are equipped

with only one pump, while two pumps are required in each. The second pump is necessary to provide mechanical standby in the event of failure of the main pumping unit and each unit must be capable of pumping the peak flow.

Seven of the eight stations are equipped with emergency high level overflows with discharge to storm sewers or nearby creeks. The Hillyard Street station does not have an overflow. Accordingly, when this station fails to pump all the incoming sewage, it simply fills to the top of the station and overflows onto the street.

Most of the stations can be modified to include the additional equipment now required, but some, such as the Hillyard Street and Hope Street stations, will require complete replacement.

There are no alarm systems on any of the sewage pumping stations and, with the present inspection program of three visits per week, it is possible that failure of one of the stations could occur and cause an overflow to a watercourse, and possibly to basements, for a lengthy period of time without notice. Accordingly, high level

alarms are recommended at all stations with the annunciator placed desirably at a location which has 24 hour attendance or, at least, in the main control panel of the sewage treatment plant.

Additionally, it is recommended that stations with long forcemains be equipped with a valved tee connection so that portable pumping units could utilize the forcemain in the event of breakdown of the pumps in the station. To minimize service interruptions, it is suggested that this facility be installed at the time other major works are carried out at a particular station.

All stations should be provided with a water supply suitable for cleaning and wash down purposes. This is not available at any of the stations. Stations that include both wet and dry wells should have a 3/4 inch water service and hose bib located in the dry well if it is not subject to being inundated through flooding of the wet well. Stations where there is not adequate separation between wet and dry well, or submersible pump type stations, should be provided with a yard or fire hydrant located nearby.

Vehicular access was considered to be satisfactory to all stations.

In addition to the portable generator set, it is recommended that suitable portable pumps be provided to the Town Works Department to permit pumping of sewage from each pumping station in the municipal sewer system to minimize overflow during emergency conditions. Considering the number and size of the existing stations, it would appear that two 300 gpm pumps should be provided. Also, a single 10 h.p. 550V - 3 phase portable generator set would seem adequate to serve those stations which need not be provided with stationary standby power.

The individual sewage pumping stations are discussed separately in the following section of this report.

A detailed description of the sewage pumping station, together with a sketch of the station layout,is included in Appendix 'A'.

King and East Streets Sewage Pumping Station:

This station was built in 1919 and is located northeast of the intersection between King and East Streets, on the sewage treatment plant property. The service area includes a small development southwest of the station, and the area along York Road north of Hunter Street, which includes the Martingrove Heights and Willow Creek Developments through the Sleepy Hollow sewage pumping station which discharges to sewers leading to the subject facility.

The station is built of concrete and has a brick super structure. It was originally designed to utilize pneumatic ejector type pumps with motors and compressors located on the main floor above the compression chambers. Subsequently, it was provided with a 7 ft. wide, 10 ft. long and 17 ft. deep wet well and a 10" diameter common suction pipe to two vertical centrifugal pumps which were installed to replace the ejector pumps. Each pump is fitted with a gate valve on the suction piping and check and gate valves on the discharge piping, and each unit can be individually removed for maintenance and servicing.

However, both pumps and shafts are badly worn and should be replaced if, due to age, the present units cannot be economically repaired.

Access to the wet well is extremely dangerous as the pump control wires are positioned beside the access ladder. A person entering the wet well could be electrocuted if the station is not shut down.

With the present high flows due to storm and ground water infiltration into the sewer system, we understand that the existing 960 gpm pump is always placed on a first duty call basis. However, the pumping efficiency of this unit is questioned and it is doubtful that it is, in fact, pumping in excess of 550 gpm. Similarly, it is suspected that the smaller of the two units, while rated at 400 gpm, is likely pumping at a much lesser rate. Based on a general assessment of the areas served, it would appear that, except for storm and ground water infiltration, the existing development draining to the station could be served by 2 - 500 gpm pumping units, which could be readily accommodated in the existing dry well. Redevelopment or enlargement of the existing drainage area would, naturally, require larger pumping units.

A high level alarm has not been provided and adequate ventilation is not available. A stationary standby power unit should be provided at this station.

It is recommended that either the existing pumps be repaired or two new pumps be installed in the existing station, together with the relocation of existing control wires, the installation of an alarm system, ventilation facilities and standby power, using the existing structure, unless extensive new development is approved in the drainage areas. In this regard, it is noted that much of the serviced area borders on the Niagara Escarpment and, therefore, it is reasonable to expect that additional flows to the station will be mainly occasioned by more intensive redevelopment of the existing land uses.

Hillyard Street Sewage Pumping Station:

This station was built in 1962 on Hillyard Street, opposite the Dundas District High School, at the edge of the travelled portion of the road allowance. Although the station was intended to be temporary, there is no reference in the original plans on the ultimate facility to be provided. The station serves only a few homes and a high school at the present time.

The station is housed in a 4 ft. diameter concrete manhole with a slab separating the dry and wet wells. The motor for the pump is located on a platform above the wet well and the wet well is approximately 12 ft. deep. The station includes only one pump and no emergency high level overflow has been provided. The top portion of the station, which houses the motor and the electrical and control panel, has been constructed from manhole rings by simply placing one 1 foot section on top of the other over which a light cover has been placed to protect the equipment from vandalism and weather.

The head room available in the motor compartment is 4 ft. The station is not vented or equipped with an

alarm system. Presently it is not possible to enter the wet well, unless the pump is removed and, accordingly, any repairs to the pumping unit require that the station be allowed to fill with sewage unless the repairs to the pumping unit can be carried out over a short enough time to reinstall the pumping unit before the station overflows on to the street.

There is insufficient room to install a second sewage pump in the station. Therefore, it is recommended that this station be replaced with a new facility. The present structure should be converted to a manhole, through the removal of the top 4 ft. section which forms the present motor chamber, and installation of a standard manhole frame and cover. The new station should be located on the east side of the road allowance with a high level overflow, access to the wet well, venting and other ancillary facilities.

It is suggested that the station be constructed approximately 6 ft. in diameter and that submersible pumps be installed so that they can be readily removed individually without interrupting the operation of the remaining unit. Since these pumps and motors are integral units, a dry

well would not be required. All switchgear could be located on an adjacent hydro pole. The station should be equipped with suitable electrical connections so that it could be operated through the use of a portable generator set.

Hope Street Sewage Pumping Station:

The Hope Street sewage pumping station was built in the early 1940's at the east limit of Hope Street. It serves the development along Hope Street and the Central Park Area. Additionally, a new apartment development on Governor's Road will be connected to this station in the near future.

The station is of the wet and dry well type, constructed of reinforced concrete and a block super structure. A manhole is provided on the incoming gravity sewer immediately adjacent to the station. The station contains one pump with the floor drainage of the dry well and overflow discharge to Spencer Creek. The floor drainage of the dry well should be collected in a sump and pumped into the wet well. Ventilation is not adequate and an alarm system is not provided. Although a wall thimble equipped with a gate valve is provided in the wall separating the two wells so that a second pump could be installed, the existing dry and wet wells are too small to accommodate a second pump and provide satisfactory cycle time for the pumping units. This is particularly pertinent in considering the anticipated sewage flow

from the new apartment project which is now under construction on Governor's Road.

The existing pump is equipped with a gate valve on the discharge piping only. In view of this and the relatively long force main, to remove the pumping unit it is necessary to permit flooding of the dry well since the suction piping cannot be sealed off. This makes maintenance very difficult and, as a result, the pump does not receive the necessary attention.

In considering the improvements necessary at this station, the only alternative which appears reasonable is the construction of a new facility, perhaps located on the opposite side of the Creek. This location is suggested for two reasons: 1) because it is at a lower elevation which would facilitate gravity flow from future development that is now in progress along Governor's Road and 2) it is understood that site limitations at the existing location are quite restrictive on account of the narrow road allowance on a dead end street. Alternatively, it may be possible to construct a sub trunk sanitary sewer from the existing trunk sewers on Main Street. The cost of this alternative, if it does not significantly exceed

the cost of the new station, has the advantage of eliminating one pumping station in the Town of Dundas and thus reduce the overall maintenance and operating costs.

Subject to a more detailed investigation, it is considered that the construction of a submersible type pumping station equipped with an overflow, stationary standby power and two sewage pumps, each capable of a pumping rate of approximately 450 gpm, may be adequate to serve the existing and new apartment development. However, if additional development in the area is anticipated, then a larger facility would be required. A pumping station larger than the existing one would also, in all probability, require the construction of additional forcemain capacity along Hope Street and McMurray Street to Hatt Street.

Based on the possibility of eliminating the station altogether, we have investigated the cost of the two alternatives involving respectively, 1) the construction of a new station complete with pumping and ancillary equipment, and a standby power unit in the existing station super structure and 2) a sub trunk sewer along

Spencer Creek. Our preliminary investigation indicates that the capital costs may favour slightly the gravity sewer alternative. Accordingly, the hydraulics and physical conditions in the Main Street sewer should be investigated before deciding on the alternative to be selected.

Sleepy Hollow Sewage Pumping Station:

The Sleepy Hollow station is located at the southwesterly limit of Sleepy Hollow Court. It is similar to the Hillyard Street station, except that an overflow is provided at the upstream manhole, approximately 200 ft. east of the station, with discharge to a small watercourse.

The station was built in the mid 1950's and does not have access to the wet well, unless the pump is removed. The structure is 6 ft. in diameter with the top 4 ft. serving as a motor and electrical control chamber. The wet well below the motor chamber is 15 ft. deep and the forcemain discharges to the sanitary sewer on York Road west of Sleepy Hollow.

The present pumping unit is larger than that now required and, unless extensive future development is anticipated, it is suggested that a smaller pumping unit could be provided. Since two pumps should be used, we would suggest the installation of two submersible type pumps in the existing wet well and the relocation of the electrical equipment on an adjoining hydro pole, to

remove it from the present moist environment. A high level alarm system should also be installed and connections should be provided for the use of a portable generator set during power outage.

University Garden Sewage Pumping Station:

The University Garden station is located north and east of the terminus of Grant Blvd. and serves the University Gardens extension, which was built in the late 1940's and early 1950's. Approximately 60 homes are connected to this station.

The station is a reinforced concrete and brick structure with wet and dry wells. A single vertical shafted pump is powered by an electric motor positioned on the main floor of the station. The sewer inlet to the station is near the floor of the wet well which has an operating depth of 8 ft. The overflow is located 6 ft. below the main floor and, apparently, when sewage has been at this level, there have been no reported basement floodings. The pump now has adequate valves for maintenance purposes and the Town owns a similar pump which is stored at the sewage treatment plant.

The installation of a second pump will require shut down of the station to modify the piping and insert a new suction thimble into the wet well. The access rungs to both the wet and dry wells are not safe and should be replaced with safety rungs. Structurally, the pumping station appears

to be satisfactory and, with the installation of the second pump, together with adequate heating, ventilation and safety measures, high level alarm and connections for a portable generator set, the facility should provide adequate service. We are not aware of any extensive developments planned in the area and, accordingly, would not recommend larger pumps at this time.

Apparently, a major defect exists which was created when the area was landscaped and the creek diverted. A yard catchbasin was placed in the depressed area around the station with discharge to the wet well. The outlet from this catchbasin should be redirected to Spencer Creek since, although its drainage area is small, relatively large quantities of water can be discharged to the station. In addition to a possible overloading of the station, this generates additional flow to the sewage treatment plant and increases the undesirable by-passing of sewage to Spencer Creek.

Dundanna Terrace Sewage Pumping Station:

The Dundanna Terrace pumping station is located on the north side of Terrace Drive, west of the easterly intersection with Turnbull Road. It was built in 1970 and serves the Dundanna Terrace development.

The station is of the pneumatic ejector type equipped with two compressors and, except for some maintenance problems reported with regard to "sticky valves" and leaking air gaskets, it has generally performed satisfactorily. An overflow is provided on the collector sewer with discharge to Silver Creek.

The provision of an alarm system and electrical connections for a portable standby generator would appear to be the only additional requirements at this station.

Creighton Road Sewage Pumping Station:

The Creighton Road pumping station was built in 1964 and serves the Cold Water Creek area.

The station is housed in a wet and dry well reinforced concrete structure completely below grade. Separate accesses are provided for each well. The wet well is divided into two sections so that a second pump can be installed without interrupting the operation of the existing unit. Also, one-half of the station can be shut down completely for maintenance and modifications without requiring the by-passing of sewage to the small creek adjacent to the station.

The station was originally designed to include a second pump so that, when the entire service area was developed, both pumps would operate simultaneously to pump the maximum flow to the station. The Ministry of the Environment, as noted earlier in this report, now requires that sewage pumping stations be equipped with two pumps each capable of pumping the maximum flow. It is understood that the original station design was based on a service population of 2,240 persons. This generates

a peak flow of approximately 600 gpm. However, it should be noted that the entire area is not fully developed. Subject to further investigation and assuming that no significant additional development is to be served, it is possible that a second pump of similar size would be adequate to provide the standby pumping capacity required. Since the wet well is divided, a second set of liquid level controls are required with the second pump. All piping is now installed to facilitate the installation of the second pump and it is considered to be adequate for the purpose.

With the recent reconstruction of the existing electrical, ventilation and dehumidification facilities, the station is considered to be satisfactory, except for cleaning and painting the existing piping, the installation of a standby pump, the provision of a high level alarm system and the installation of a stationary standby power unit.

Hillside Sewage Pumping Station:

The Hillside station is located in a small park on the southerly end of Hillside Avenue. The facility serves the Hillside, Sherwood Heights and Sherwood Close areas and was constructed in the early 1950's.

The station is housed in a reinforced concrete structure located entirely underground with separate hatches for the dry and wet wells similar to the Creighton Road station. The existing pump appears to be adequate for the presently connected population of approximately 1,400 persons.

A second pump is required in the station in addition to alarm controls and stationary standby power. A general cleaning and painting of the station piping is also recommended. This station could be equipped with stationary standby power by locating a generator set in a separate small enclosure adjacent to the access manholes to the station, without interfering with the use of the park.

SANITARY SEWER SYSTEM

SANITARY SEWER SYSTEM:

General Description:

The Town of Dundas is located on the west limit of Cootes Paradise, with the historic Desjardins Canal connecting the Town to the Hamilton Harbour and Lake Ontario. The natural outlet for all watersheds in the Town is Cootes Paradise. Spencer Creek essentially divides the Town into two portions with the main section being north of the Creek. The Creek flows in an easterly direction parallel to the Canal for some distance before it outlets into Cootes Paradise.

The sanitary sewer system generally parallels Spencer Creek and its tributaries. Since the Town of Dundas has owned a sewage treatment plant for many years and the original plant was constructed at the time of the initial sanitary sewer construction, all sewers and forcemains terminate at the present plant site. However, the topography of the area made it necessary to construct inverted syphons and sewage pumping stations to convey sewage to the plant.

The following is a description of the specific areas of the town with regard to the adequacy of the existing

sewer system for present and future development. The entire sewer network is shown in Appendix 'D' of this report.

South Easterly Area:

The south easterly area is referred to as that area including the Sheldon Manor, University Gardens and University Gardens Extension Developments. These developments are connected to the main sewer system through an 8" syphon which crosses Spencer Creek to the Huron Street main trunk sewer which outlets to the existing sewage treatment plant. The main syphon is approximately 3,700 feet long with a total fall of approximately 40 feet. The estimated peak flow capacity of the syphon is approximately 540,000 GPD, which is capable of serving a connected population of approximately 1,600 persons on the assumption that only sanitary sewage is discharged to the collection system. Presently it is estimated that there are approximately 1,200 persons connected in these developments.

The upper end of the syphon is divided into two portions, with an 8" branch continuing to Sheldon Street and a 6" branch to David Street. The David Street branch was reviewed and it is estimated that it is capable of serving a population of approximately 800 persons. Again, the actual population tributary to this syphon is less than

its indicated capacity. However, it is understood that there have been reported problems with this section, with sewage backing up into basements. Since the area served by this branch has storm sewers only on Colemar Place, illegal connections to the sanitary sewers are suspected to be the main cause of the problem.

A more exhaustive investigation is required to determine the actual capacity of the entire syphon and the quantity of sewage now discharged to it and Council is advised against further development in the area until the actual hydraulic limitations of the system are known and facilities are constructed adequate for present and new development.

This area includes the University Gardens sewage pumping station, which is discussed in some detail in other sections of this report.

South Central Area:

The south central area of the town includes the Sherwood Heights, Sherwood Close and Hillside Avenue Developments. These areas discharge to the Hillside Avenue Sewage Pumping Station from where the sewage is pumped northerly to a sanitary sewer on Hillside Avenue. From this point, sewage flows by gravity to the sanitary sewer system on Osler Drive which connects to the Main Street sewer.

There are no reported problems in this area and it is noted that most of it is served by both storm and sanitary sewers.

South West Area:

The south west area of the town includes the Forest Glen, Dundanna Terrace and the Pleasant Valley Developments. Most of these areas are served by both storm and sanitary sewers and apparently there are no reported problems. The Dundanna Terrace sewage pumping station, located on Terrace Drive, is the only station in this area.

The area in general outlets at two points. The easterly area is connected to the sub trunk sewer that parallels the north bank of Coldwater Creek by a sewer in Portal Court and through the Coldwater Creek Valley. The central area is connected via a sewer on Glen Court and its extension across Coldwater Creek to the same trunk. A brief review of the two connecting sewers to the Coldwater Creek trunk, indicates that the combined capacity of the two links, approximately 3.2 cfs, is satisfactory for the development in this area.

West Central Area:

This area includes the Valley Heights Estate, Highland Park, Highland Hills Annex, the Highland Hills and Highland Court areas. The outlet for this area is the Coldwater Creek sub trunk sewer which connects to the Ancaster Road trunk immediately south of Main Street.

The Valley Heights Estates is served by the Creighton Road pumping station which discharges to the Highland Hills Annex sewers. The Coldwater Creek trunk includes a twin syphon with 12" and 6" pipes under Coldwater Creek. The estimated capacity of this trunk is 8.5 cfs, which, based on a peak dry weather flow, should be capable of serving approximately 12,000 persons, as compared to the presently estimated population of about 8,000 people. However, it is noted that very little of this area is served with both storm and sanitary sewers. Accordingly, actual flow measurements are recommended to determine the present conditions of the sewers before considering further development in the area up to the indicated capacity of the outlet trunk.

North West Area:

The north west area includes the Morton Park, the Central Park and the downtown area. This area contains the Hope Street sewage pumping station, which serves the Central Park area and the Hillyard Street sewage pumping station, which serves the district high school and a number of homes.

The trunk sewer on King Street, east of Main Street, carries the entire sewage flow from this area. While most of the area is served only by sanitary sewers, storm sewers are included in the King Street and Main Street areas. Except for the new development on Governor's Road, which is now in progress, and its effect on the Hope Street sewage pumping station, there are no reported problems in this area. The effect of the apartment development on the Hope Street sewage pumping station is discussed in an earlier section of this report. However, in reference to Main Street, opposite the town hall, it is noted that, the contributing sanitary sewers south of Dundas Street, are capable of carrying a sewage flow far in excess of the capacity of the sewer on Main Street between Dundas and Baldwin Streets. The upstream sewers are capable of a flow of approximately 10 cfs,

whereas the portion adjacent to the town hall is capable of only a flow of 5 cfs. Apparently, this section of sewer was planned for reconstruction some time ago, but the program was deferred due to high water table and difficult construction conditions. However, it is recommended that this area be given immediate attention and that a larger sanitary sewer be constructed on Main Street between Dundas and Baldwin Streets to alleviate the present problem.

North East Area:

This area includes the Martingrove Heights and Willow Creek areas, and the area between Cootes Paradise and York Road southerly to Spencer Creek. The area is served with a number of outlets all terminating at the sewage treatment plant site. The Hunter Street sewer is the main trunk to the sewage treatment plant. The King and East Street sewage pumping station serves the southerly portion of this area, in addition to the area north of Hunter Street along York Road, and discharges within the plant site to the trunk sewer leading to the sewage treatment plant. Also, this area includes the Sleepy Hollow sewage pumping station which serves the Willow Creek development.

A review of the sanitary sewers in this area indicates that there could be problems associated with the sewer on York Road between the southerly and northerly legs of Cameron Avenue. The sanitary sewers northeast of the northerly intersection between York Road and Cameron Avenue have a capacity in excess of approximately 3.2 cfs, whereas the downstream sanitary sewers have a capacity of only 1.8 cfs. This problem could be alleviated to

some extent by constructing a second sanitary sewer along York Road from the northerly leg of Cameron Avenue to outlet to the existing sanitary sewers on East Street. A review of this part of the system would indicate that the existing sanitary sewers should have adequate capacity. However, it is noted that the area does not have storm sewers, except on Marion Crescent and, accordingly, illegal connections to the sanitary sewer system can be expected.

From the review of the sewage collection system, it is apparent that a number of areas require further attention and a more detailed study is, therefore, recommended. As noted in the section of the report dealing with the Industrial Waste By-Law, the specific problem areas discussed in this report should be investigated to determine the extensiveness of downspout and other illegal connections to the sanitary system. Additionally, substantial new developments or redevelopment of existing areas to more intensive land uses should not be approved until a thorough assessment is made on the effects to the present sewerage system. While some sewage capacity may be available in certain portions of the system, the amount of apparent reserve may, in fact, not be available on account of infiltration and illegal connections into the sewer system.

INDUSTRIAL WASTE BY-LAW AND PLUMBING

INDUSTRIAL WASTE BY-LAW AND PLUMBING:

Industrial Waste By-Law:

A copy of the Town of Dundas Waste By-Law No. 2562-71 is included in Appendix 'B' of this report. This by-law has been reviewed and found to be acceptable in all respects. It is similar to the recommended by-law as prepared by the Industrial Waste Branch of the Ministry of the Environment and, accordingly, when enforced, should provide Dundas with the protection needed.

Spills which are infrequent are difficult to trace to the point of origin, particularly since the composition of some "oily" discharges will change in transit through the sewer system. Should the spills become sufficiently frequent to cause severe plant upset and cost to the Town, then an extensive monitoring program would be required to locate the source. In any event, all spills should be recorded in the plant log and, if there is a repetitive pattern to the time of each similar spill, this would indicate the seriousness of the problem and would assist in identifying the source and in adopting appropriate corrective measures. We are not aware of a serious problem at the present time.

Plumbing:

There are certain plumbing problems which should be considered. These concern the discharge of down spouts from residential buildings to the sewer system via the footing drains. This practice, while difficult to correct, should be controlled since it can cause severe hydraulic overloading of the entire sewage system. The elements of the system more particularly affected include the local street sewers, syphons, pumping stations and the plant. Backups and overflows cause a public health problem in addition to water pollution. One means of providing some control is to require that all plumbing within a building be inspected to ensure that it complies with the present Ministry of the Environment Plumbing Regulations before the issuance of building permits for any improvements to existing buildings. This could include the requirement that precast, or custom built, concrete splash pads approximately 2'x3' be provided at all downspouts to direct the water away from basement walls.

SEWAGE TREATMENT PLANT

SEWAGE TREATMENT PLANT:

General:

Numerous site inspections have been carried out by our staff and also references have been made to the Ministry of the Environment Evaluation Report of 1971 on the plant.

The blowers are now operated to maintain sufficient air in the plant. Consequently, the remaining odour problems are associated with the present method of returning the digester supernatant to the plant and the conditions of the sewage pumping stations and the Desjardins Canal. The problems associated with the sewage pumping stations have previously been discussed. The digester supernatant will be redirected to the aeration tank of the plant extension where, with dilution of the liquid in this tank and the high intensity aeration, the present problem should be resolved.

Some mechanical problems exist in the present plant relative to the comminutor (raw sewage grinder) and settling tank weirs. Additionally, the King and East

Street sewage pumping station has caused hydraulic conditions at the plant which have hindered the operation of the primary settling tanks.

Presently sludge from the plant digester is disposed on to surrounding farm lands. The digesters are adequately sized to accommodate the present plant and perhaps the expanded facility, depending on the effect of the phosphorus treatment system. We suggest that the digesters remain as they are at the present time until the effect on the sludge production from the expanded plant is known. The plant scale phosphorus nutrient test will assist in providing information to enable an approximate prediction on the digester capacity required for the expanded facility. However, to reach more definitive conclusions and in the interest of staging the expansion and improvement program to the financial ability of the Town, we would propose to review this aspect after the expanded works have been operating for 6 to 12 months.

The delay in obtaining the information necessary from the plant scale nutrient test has been due to late delivery

of equipment. The test was started before the fibreglas aluminum sulphate liquid storage tank was received, by using a 1,000 gal. steel storage tank obtained from the Town Works Department. The difficulty with this arrangement was corrosion of the tank and plugging of the solution pump and associated piping. However, sufficient information has been obtained to date to indicate that the aluminum sulphate injection point should be following the aeration tanks (other locations will be provided to enable flexibility in the operation of the plant). This dictates that the final settling tanks must be designed to suit the settling characteristics of aluminum sulphate.

Aluminum sulphate (Alum) when added to water, forms a whitish floc particle under controlled conditions which appear similar to small snowflakes. These particles react chemically with the water and attract phosphate compounds in addition to others. Subsequently, the particles settle to the bottom of the tank and are removed with the sewage sludge. It is this settling phenomenon which restricts the hydraulic loading on a settling basin to approximately 800 gpd/ft.^{2} of tank surface. The existing plant has settling tanks which are operated under much higher loadings and result in the required down rating of the plant to

about 1.5 mgd. The new facility is, therefore, designed to treat 2.5 mgd in order to obtain a total treatment capacity of 4.0 mgd. The new extension will receive for treatment the digester supernatant liquid and the waste activated sludge from the existing plant, in addition to the waste activated sludge from the new plant extension.

The new facility will also have new inlet works, including a raw sewage grinder, bar screens, and aerated grit removal tank, as well as a new chlorine contact chamber, since the existing works are only capable of treating the sewage received at the existing plant.

It is considered impractical to expand the treatment plant capacity by minor upgrading to the present plant. Also,from a cost standpoint a new facility is deemed to be more economical than a significant modification to the existing plant.

A number of treatment plant alternatives have been considered for the Town of Dundas. The following sections set out our considerations and recommendations.

Chemical-Physical Treatment Process:

This type of process is similar to that practiced at many water filtration plants. Chemicals are added to the sewage and are allowed to settle for the removal of the very small particles remaining in suspension. The process is not biological and, as such, is not affected by the same problems that can upset the process as used in the present plant. However, a large portion of the constituents that require removal in a sewage treatment plant are in the dissolved state and, in this form, are not easy to remove in a chemical-physical process. Additionally, the quantity of waste sludge produced in a chemical-physical process is greater than that from a biological one. This results in relatively high cost for the disposal of the sludge.

In addition this process would not be compatible with the existing plant and would require that the present operating staff acquire additional skills. We have, therefore, rejected this method of treatment.

Extended Aeration Activated Sludge Process:

The extended aeration activated sludge process deletes the need for a primary settling tank. The raw sewage is directed to a large aeration tank sized to provide approximately 24 hours retention from which the effluent is discharged to a final settling tank. The process produces very little waste activated sludge and could be incorporated into the present treatment plant. Since this is a biological process it could receive the excess sludge from the present plant and this would not increase the loading to the present digesters. However, the plant extension would be quite large and would require high horsepower motors to power the aerators. Power and land requirements would thus be substantially greater than those necessary for a conventional process. The accumulation of alum in the aeration tank and its effect on the treatment process is not known. Also, this process normally requires that sludge be removed on an intermittent basis. Lastly, with the use of alum for nutrient removal, it would be necessary to continuously remove quantities of sludge to prevent the build up of alum in the system. For these reasons, this alternative has been rejected.

Modified High Rate Activated Sludge Process:

A number of alternatives are available which are adaptations of the conventional activated sludge process. These processes involve the use of aerobic digestion for the treatment of the waste sludge. Such processes could be incorporated into the existing plant,except for the sludge handling system. In the interest of economy and since the plant is anticipated to have a limited life, it is suggested that the process used be one that does not require new sludge treatment facilities. Also, the digestion of sludge aerobically for a large plant appears to be a more costly process than that for anaerobic digestion. For these reasons, this alternative is not recommended.

UNOX - Union Carbide Activated Sludge Process:

The UNOX process is relatively new with only a few plants now operating in the U.S., Europe and Japan. It is similar to the activated sludge process, except that oxygen gas, manufactured from air at the plant site, is used instead of air to supply oxygen to the biological process. The UNOX system requires complete enclosure of aeration tanks. The process includes primary treatment on some projects and, without the benefit of a detailed pilot plant study, we have considered that this would also be required in Dundas. The supplier's representatives state that the process produces less sludge to be treated in the digester, but it has yet to be proven as being compatible to aluminum sulphate addition for phosphorus removal.

Some experiments have indicated that, in the colder climates, the process produces sludge with high S.V.I. (Sludge Volume Index). The representatives of this process, which is patented and marketed only by Union Carbide, are of the opinion that it will produce adequate results with alum addition. The process would fit in with the present plant since it could be constructed as a separate entity

adjacent to it. The land requirements would not be extensive, but the annual operational and maintenance costs of this process in Dundas are not known at the present time.

We are not recommending this type of treatment for Dundas and would consider it only if there were an economic advantage to the Town and if the process were proven to be practical for this particular application.

Conventional Activated Sludge Process:

This is the recommended alternative. The process is essentially identical to that now existing in Dundas. However, single units would be provided as compared to the existing plant, namely, one primary settling tank, one aeration tank and one final settling tank with new inlet works and a chlorine contact tank. The primary settling tank would utilize a bridge with a single blade scraper.

The sludge would be collected at the bottom of the tank and transferred to the digester for further treatment. The aeration tank would have a square configuration with a single mechanical aerator suspended in the centre on a steel bridge or pedestal with catwalk access. This aspect would be different from the present plant in that diffused air would not be used for mixing and oxygenation of the tank contents. The mechanical aerator does not require a housing structure or any air piping and, as such, would not require a connection to the existing plant aeration system. The final settling tank would be similar to the present plant units and the sludge scraper mechanism

would be designed to operate without mechanical problems under heavy sludge loadings.

Appendix 'E' of this report provides a layout of the recommended plant and a hydraulic profile through it. Flow measurement is included in the new plant and, except for the small building associated with the sludge pumps, the plant would have no superstructures.

This recommended extension can be constructed without interrupting the operation of the existing facilities and with limited need for the contractor to work within the present plant. This is a most important consideration because the Ministry of the Environment will require continuous operation of the existing plant while constructing the extension.

We have thus concluded that this is the most suitable alternative and recommend its adoption to the Town of Dundas.

The design parameters for this process are included in Appendix 'C'.

The location of the plant extension has been dictated by the availability of land and the proximity of existing homes. While the design provides for the use of common walls between the treatment units, to provide an efficient and compact plant, it involves an encroachment on the existing parking area for the "Ball Diamond". It is hoped that suitable replacement parking space can be provided nearby.

CONSTRUCTION TIMING AND COST ESTIMATES

CONSTRUCTION TIMING AND COST ESTIMATES:

Construction Timing:

The design of the sewage treatment plant enlargement is affected by the soil and groundwater condition existing on the site, in addition to the process requirements.

The site is generally underlain with an 8 to 10 foot layer of fill material, including garbage and loose fill, on top of a dense granular base. The water table is directly affected by Lake Ontario water levels and its seasonal variations. Accordingly, the best construction time for the plant and the outfall sewer extensions, is the latter half of the year, when water levels are normally at the lowest. These and other considerations would indicate a construction start in the late spring of 1974, with completion in the summer of 1975.

The design time required for a project of this magnitude is approximately six months. Therefore, the proposed construction schedule would necessitate an authorization to commence design not later than early December 1973. This time includes a reasonable allowance to obtain

necessary approvals from various agencies, such as the Ontario Municipal Board, the Ministry of the Environment and Central Mortgage and Housing Corporation.

Cost Estimates:

The estimated costs for the project are as follows:

Plant Expansion:

Construction of a 2.5 mgd. sewage treatment plant expansion including minor improvement to the existing plant		$ 970,000	
Contingencies ,15%		145,500	
	Sub Total	$1,115,500	
Engineering design and services during construction, 12%		133,800	
	Total Estimated Sewage Treatment Plant Cost		$1,249,300

Outfall Sewer:

Construction of 3,000 ft. of sewage treatment plant outfall sewer extension	$ 232,700	
Contingencies,15%	34,900	
Sub Total	$ 267,600	
Engineering design and services during construction,12%	32,100	
Total Estimated Outfall Sewer Costs		$ 299,700
Total Estimated Project Cost		$1,549,000
Say		$1,550,000

NOTE:

This estimate is based on current costs for this type of project and does not provide any allowance for possible increases in labour, material and other costs which may prevail in 1974 and 1975.

All of which is respectfully submitted.

REGISTERED PROFESSIONAL ENGINEER
K. A. REICHERT
PROVINCE OF ONTARIO

G. T. BLACK

G. T. Black

K.A. Reichert, P. Eng.

G.T. Black, P. Eng.

APPENDIX 'A'

SEWAGE PUMPING STATION DETAILS:

General:

The following data and sketches of the sewage pumping station were generated to assist in formulating basic recommendations. Except for the Dundanna Terrace Pumping Station, detailed as-constructed drawings or design parameters are not available.

The information presented was obtained from approximate field measurements, existing plans and information available at the Town Engineering Department office and in the Ministry of Environment approval files.

Accordingly, this information is intended only to provide assistance in determining general requirements at the stations for present and future development and must be confirmed through a more detailed investigation before it can be used for final design purposes.

King and East Streets Sewage Pumping Stations:

Serviced Area: Approximately 1,500 persons.

Estimated peak dry weather sewage flow: 420 gpm.

Type of station:

Reinforced concrete below grade structure with brick superstructure. Separate wet well and dry well - built in 1919.

Installed Equipment:

1 vertical DeLaval pump 8x6, rated at 960 gpm., at 40 ft. Total dynamic head at 1,450 rpm powered by a 15 h.p. 550 volt, 3 phase Tamper electric motor.

1 vertical Smart Turner pump 8x6 rated at 400 gpm. at 45 ft. Total dynamic head at 1,450 rpm powered by a 15 h.p. 550 volt, 3 phase electric motor (make not known).

1 set of Davis electrode controls for each pump.

1 oil space heater.

Forcemain:

Two six inch diameter forcemains approximately 400 lin. ft. long and discharging to the plant site inlet manhole.

Hydraulic Conditions:

Static lift - approximately	33'
F.M. losses at a pumping rate of 420 gpm.	4'
Station losses	5'
Total dynamic head loss	42'

Pumps Required:

Two pumps each 420 gpm. at 42' total dynamic head with 10 h.p. motors. Existing pump units should either be completely overhauled or replaced with new pumps.

Other Major Equipment and Modifications Required:

Relocate level control electrodes.

Provide high level alarm, ventilation fan, diesel generator and water supply.

Hope Street Sewage Pumping Station:

Serviced Area: Present approximately 420 persons.
Imminent approximately 1,560 persons.

Estimated peak dry weather service flow:450 gpm.

Type of Station:

Reinforced concrete below grade structure including a wet well and a dry well with masonary block superstructure - built during 1940's.

Installed Equipment:

One vertical Smart Turner 4x4 sewage pump rated at 400 gpm. at 30 ft. Total dynamic head at 870 rpm. powered by a 5 h.p. 550 volt, 3 phase Reliance electric motor.

One set Davis liquid level electrode controls.

One station electric heater.

Forcemain:

One six inch diameter forcemain approximately 1,150' long discharging to a sanitary sewer on Hatt Street.

Hydraulic Conditions:

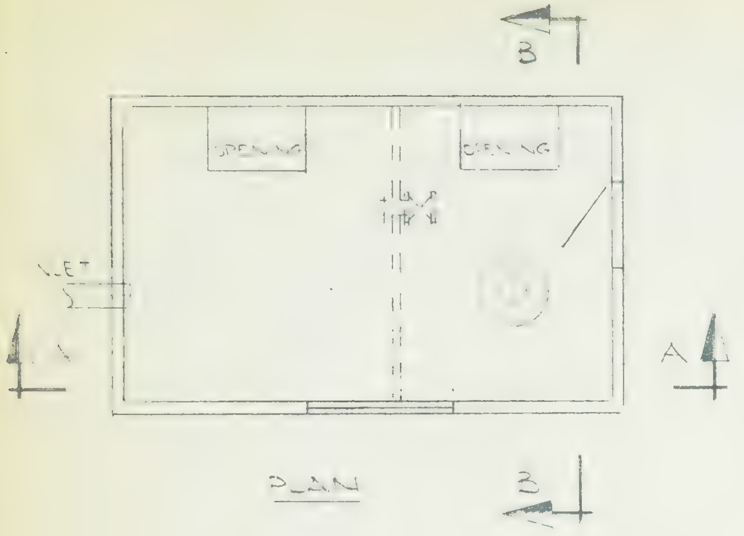
Static lift - approximately	25'
F.M. friction loss at 450 gpm. - approx.	45'
Station losses	10'
Total dynamic head loss	80'

Pumps Required:

Two submersible pumps each rated 450 gpm at 80' total dynamic head powered by a 15 h.p. 550 volt, 3 phase electric motor. ~~Flight~~ FLYGT or equal type pumps are recommended.

New Sewage Pumping Station:

A manhole type station eight feet in diameter approximately 15 ft. deep with an operating level of 5 ft. and eight inch forcemain discharging to existing forcemain located west of existing sewage pumping station. Locate electric controls on a hydro pole complete with alarm system. Standby generator with automatic starter located in existing station or in a separate enclosure adjacent to new station. Also, a water supply is required.



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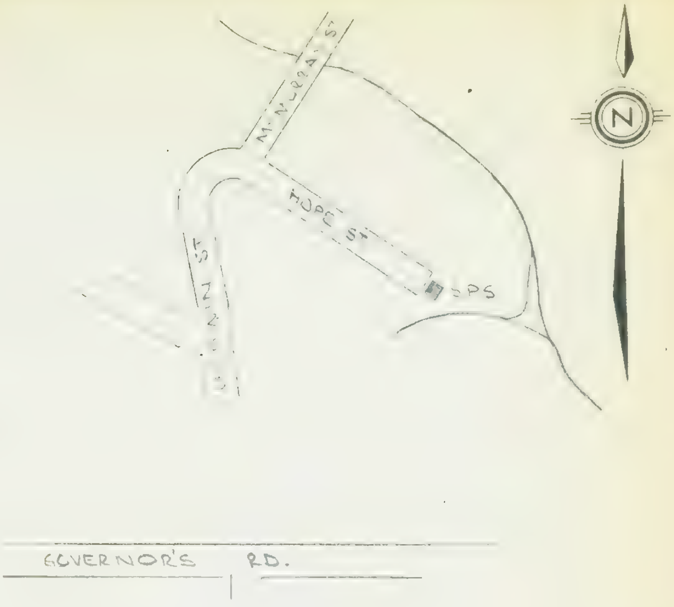

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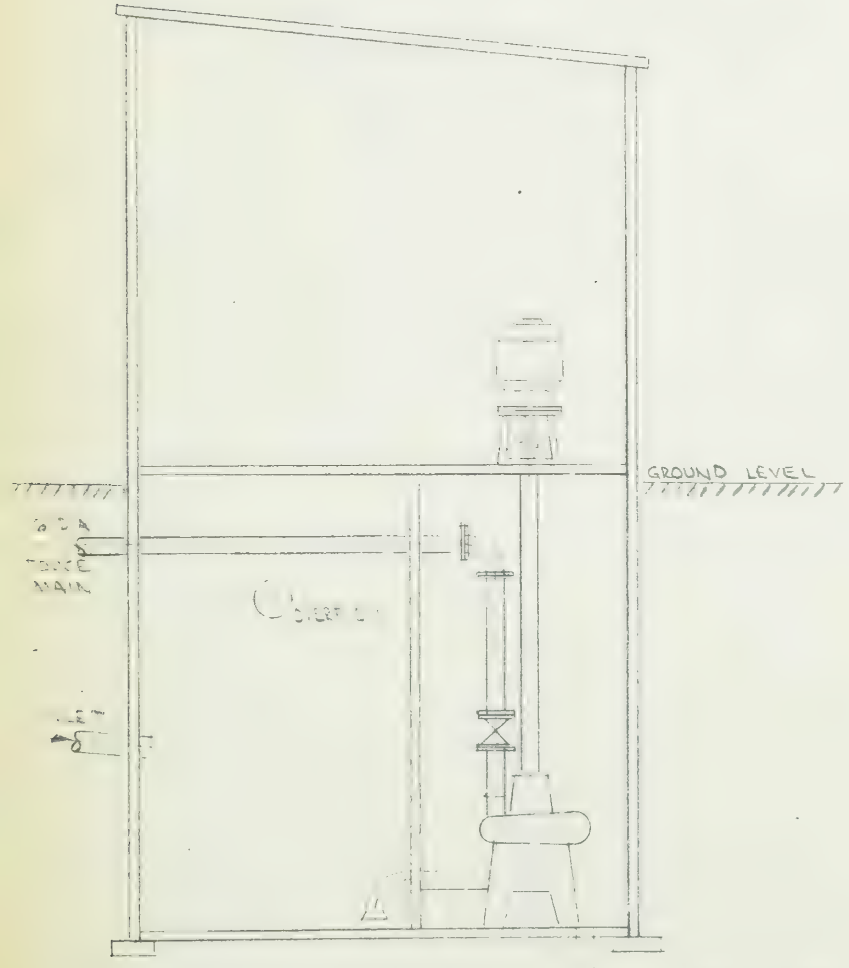

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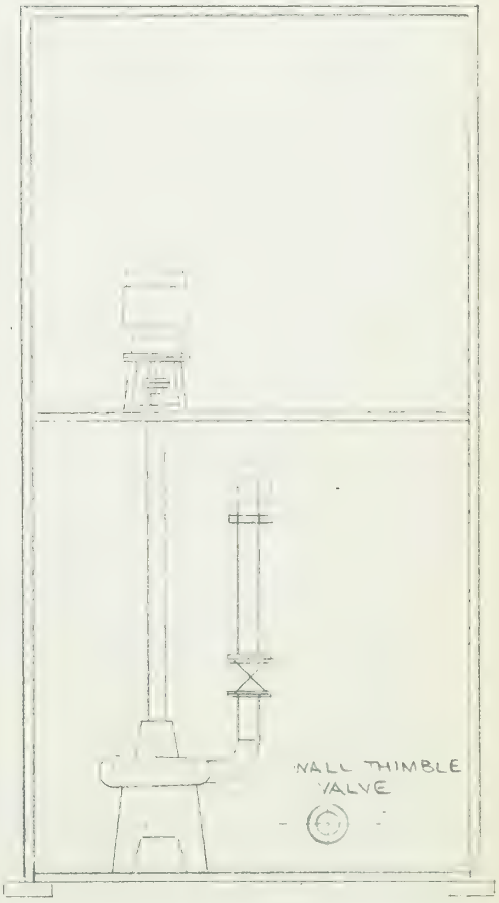
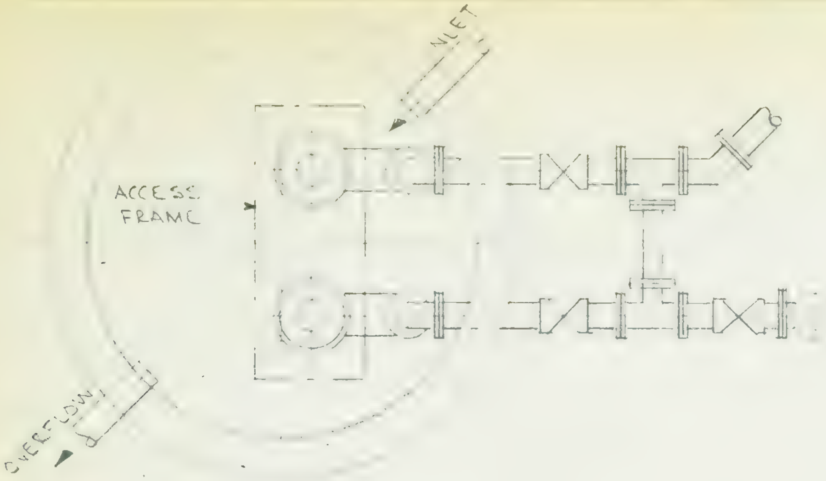


SECTION 'BB'
EXISTING

TOWN OF DUNDAS.
HOPE STREET
SEWAGE PUMPING STATION

UNDERWOOD McLELLAN & ASSOCIATES LTD

1666-01



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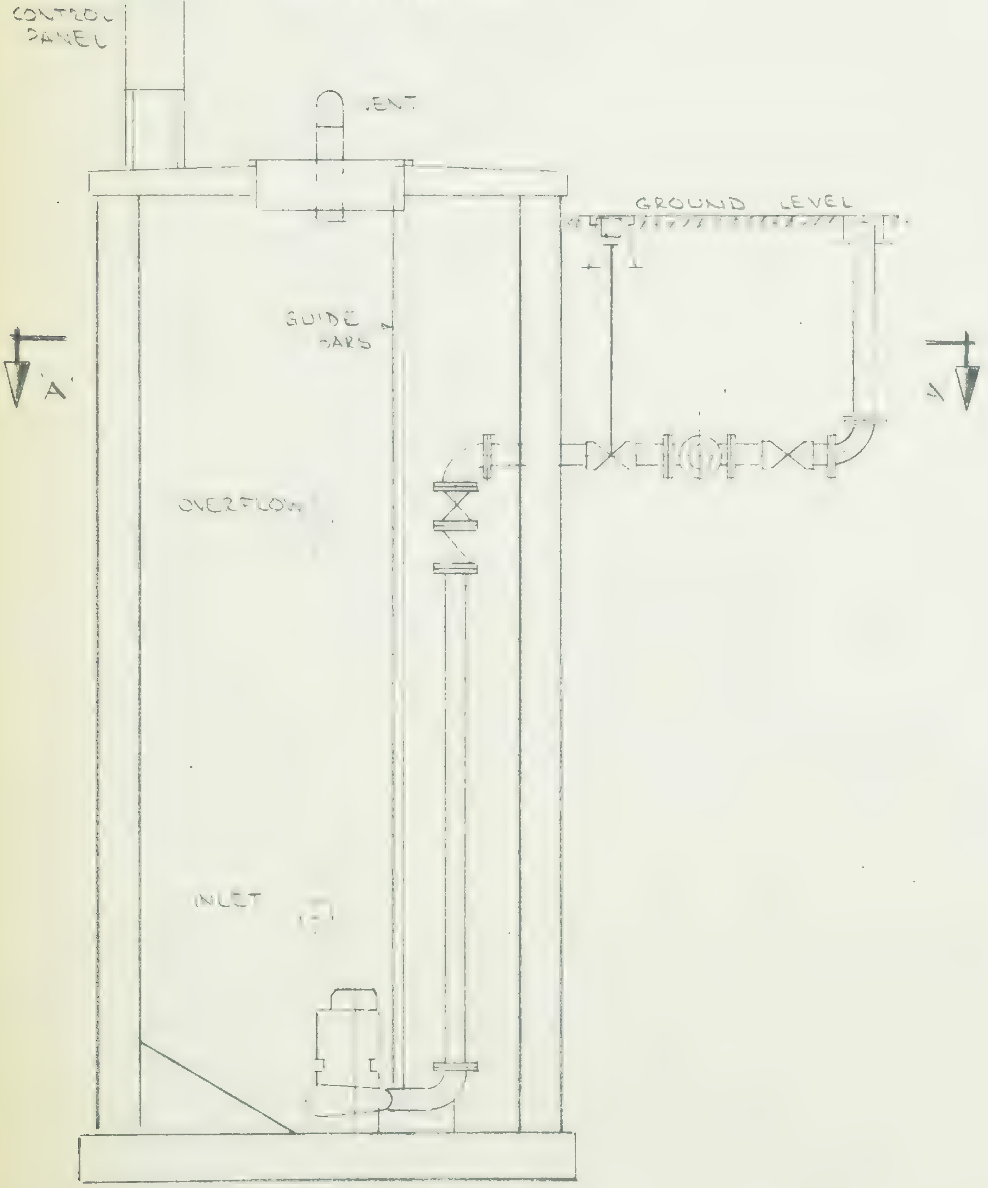
DIESEL ELECTRIC
GENERATOR LOCATED
IN METAL "DOG HOUSE"



ELEVATION

TOWN OF DUNDAS
ALTERNATE SEWAGE PUMPING
STATION FOR HOPE STREET
UNDERWOOD McLELLAN & ASSOCIATES LTD.

1666-01

Hillyard Street Sewage Pumping Station:

Serviced Area: Approximately 50 persons plus school 500 persons.

Estimated peak dry weather sewage flow: 70 gpm.

Type of station:

Circular four foot diameter manhole type well with motor chamber located directly over wet well. Built 1962 as a temporary structure.

Installed Equipment:

One vertical Smart Turner model 3 SYT, 3x3 submerged pump with motor above, rated at 100 gpm at 35 ft. Total dynamic head at 1,725 rpm powered by a 2 h.p. Robins & Meyers 220 volt, single phase electric motor.

1 square 'D' float switch.

Forcemain:

One six inch diameter cast iron forcemain approximately 425 ft. long discharging to a sanitary sewer on George Street South of Cayley Street.

Hydraulic Conditions:

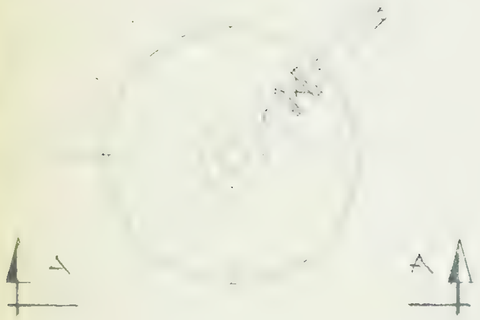
Static lift - approximately	15 ft.
Forcemain losses - approximately	2 ft.
Station losses - approximately	5 ft.
Total dynamic head loss	22 ft.

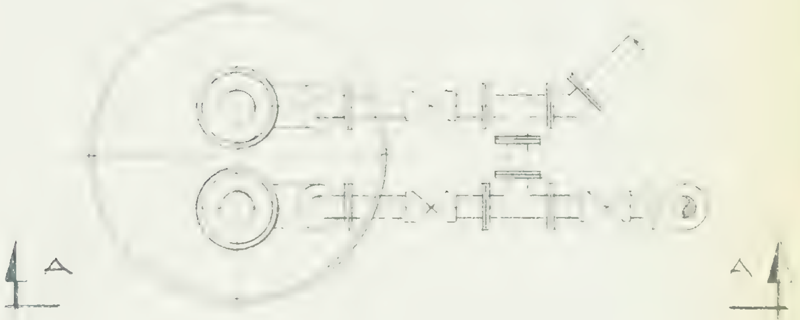
Pumps Required:

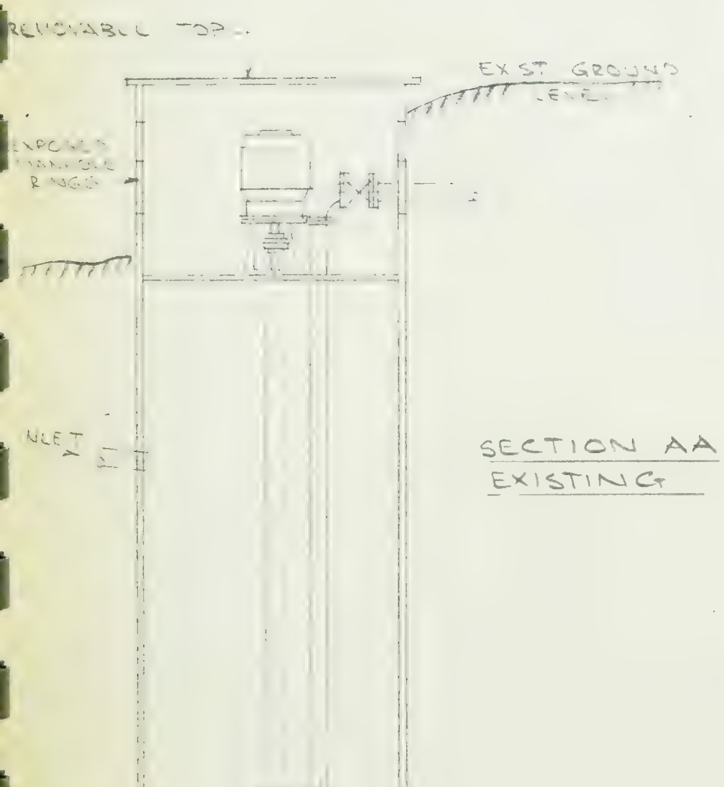
Two, each rated at 100 gpm at an approximate total dynamic head of 45 ft. with 2 h.p. electric, 550 volt, three phase motors, submersible type, "Flight" or equal is recommended at proposed location.

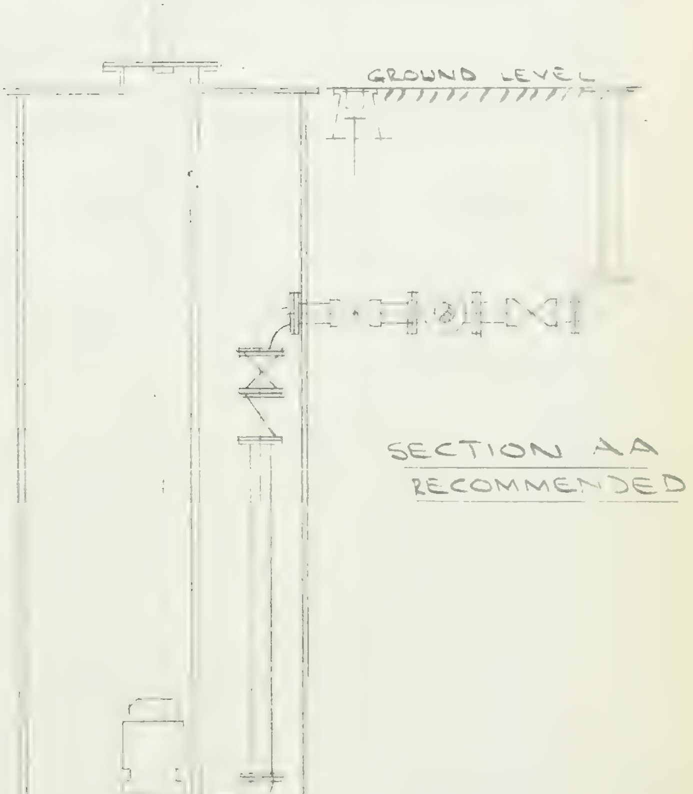
New sewage pumping station.

Concrete manhole type 6.0' in diameter approximately 15 ft. deep equipped with an overflow to an adjacent small watercourse. The wet well should be sized to provide a minimum cycle time of 10 minutes with emergency storage adequate for at least 1.5 hours under peak flow conditions. Electrical controls to include control panel on hydro pole complete with alarm system, and connectors for use of a portable generator. A water supply for cleaning the station is also required.









TOWN OF DUNDAS
HILLYARD STREET
SEWAGE PUMPING STATION
UNDERWOOD McLELLAN & ASSOCIATES LTD.

Sleepy Hollow Sewage Pumping Station:

Serviced Area: Approximately 100 persons.

Estimated peak dry weather sewage flow:40 gpm.

Type of station:

Manhole type station with top four feet serving as a pump motor chamber and enclosure for electric switchgear. Station is six feet in diameter with a wet well 15 ft. deep - built in 1950's.

Installed Equipment:

One vertical submerged Smart Turner pump model 3 SY5, 3x3, rated at 300 gpm. at a total dynamic head of 30' at 1,725 rpm powered by a Robins-Meyers 5 h.p. 550 volt, 3 phase motor.

1 set of Davis pump electrode controls.

Forcemain:

One three inch diameter forcemain approximately 600 ft. long discharging to a sanitary sewer on York Road.

Hydraulic Conditions:

Static lift - approximately	48 ft.
F.M. losses at 40 gpm	12 ft.
Station losses	10 ft.
Total dynamic head loss	70 ft.

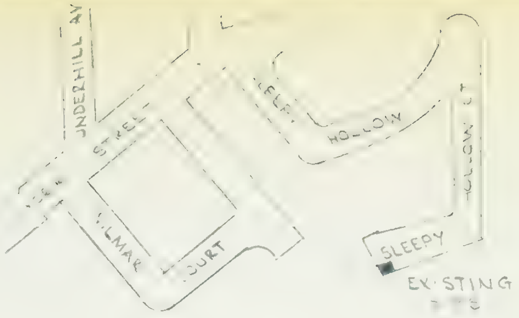
Pumps Required:

Two pumps each rated 40 gpm at a total dynamic head of 70 ft. with 2 h.p., 550 volt, 3 phase electric motors installed in the existing sewage pumping station.

Other major equipment and modifications required:

Remove the existing pump and associated equipment, install new pumps complete with electrical controls located on a hydro pole, alarm system and connection for a portable generator set. A water supply is required for cleaning purposes.

GENERATOR LOCATED
IN METAL "DOG HOUSE"



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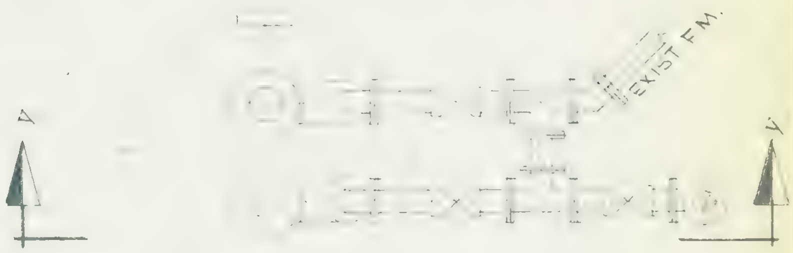

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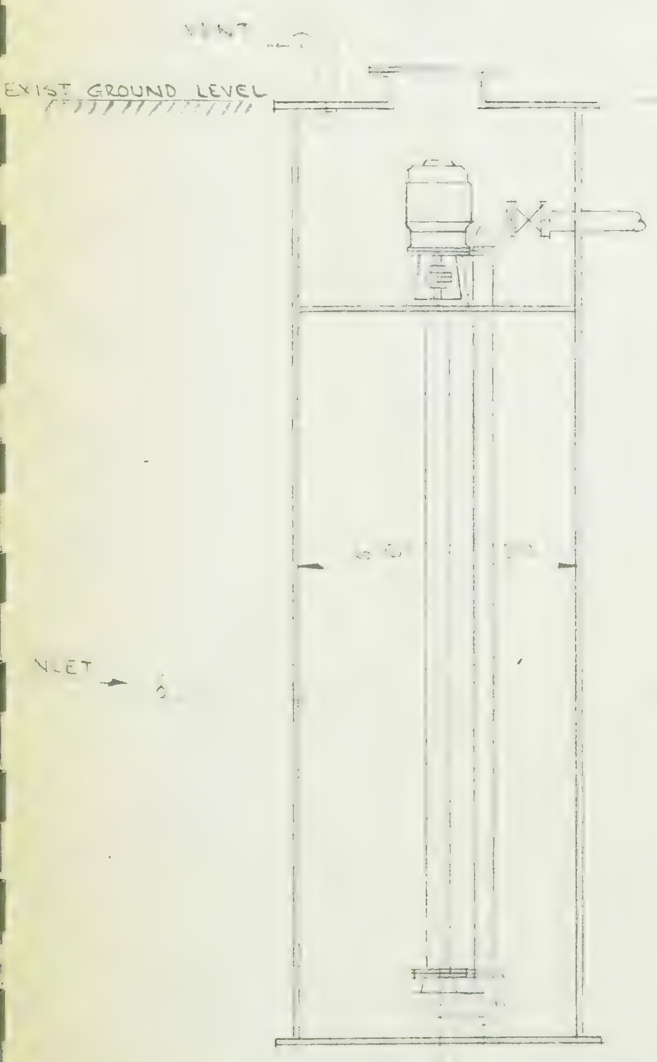

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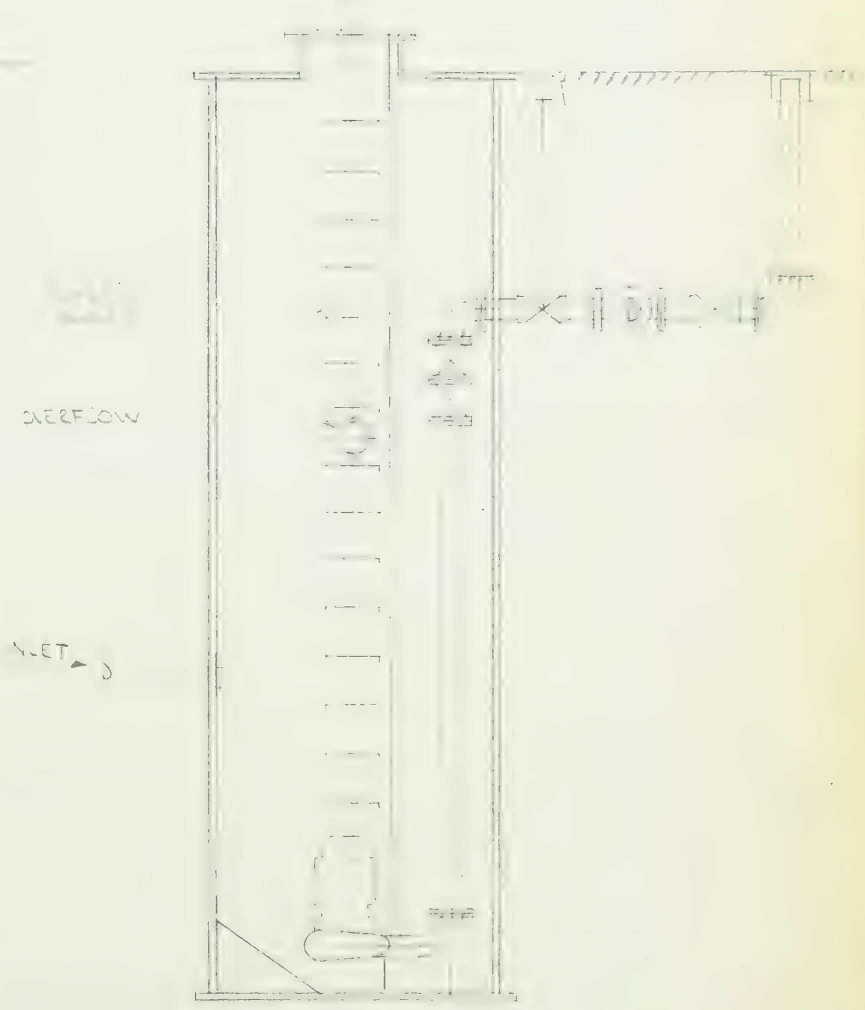


PROPOSED SECTION 'AA'

TOWN OF DUNDAS.
SLEEPY HOLLOW
SEWAGE PUMPING STATION.
UNDERWOOD McLELLAN & ASSOCIATES LTD.

16666-01

University Gardens Sewage Pumping Station:

Serviced Area: Approximately 250 persons.

Estimated peak dry weather sewage flow: 70 gpm.

Type of station:

Reinforced concrete below grade structure including at wet well and a dry well with brick superstructure - built during late 1940's or early 1950's.

Installed Equipment:

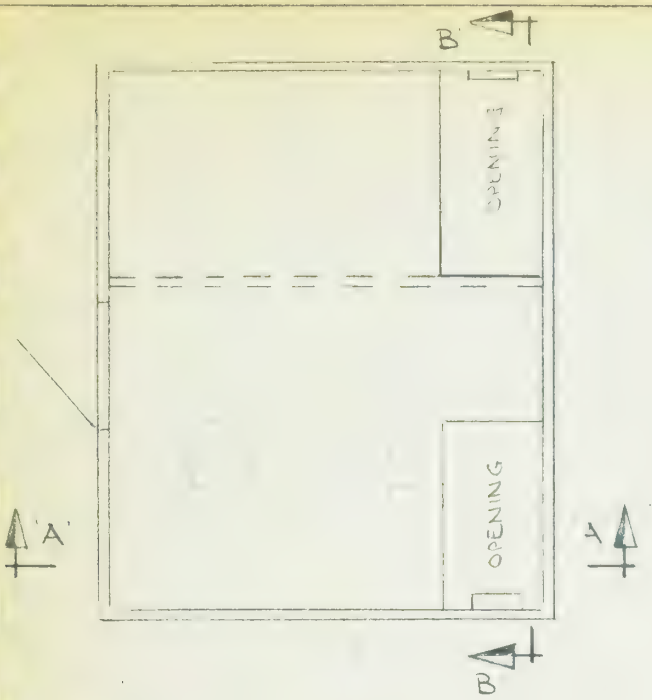
One vertical dry well type Smart Turner pump, model 3HXUB5, 3x3, rated at 50 gpm, 100 feet total dynamic head, at 1,725 rpm powered by a 7.5 h.p., 550 volt, 3 phase Robins-Meyers electric Motor.

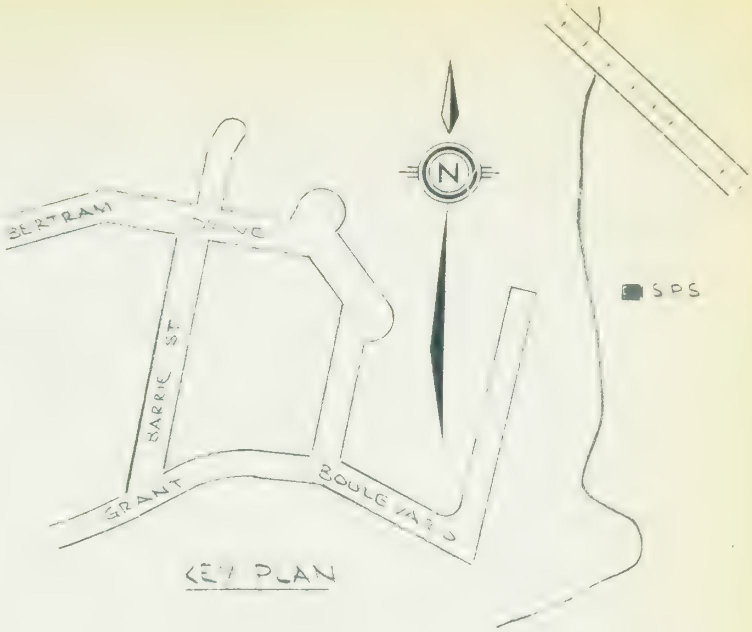
1 set Davis pump electrode controls.

1 electric heater.

Forcemain:

One six inch diameter forcemain approximately 1,440 ft. long discharging to a sanitary sewer on Bertram Drive.





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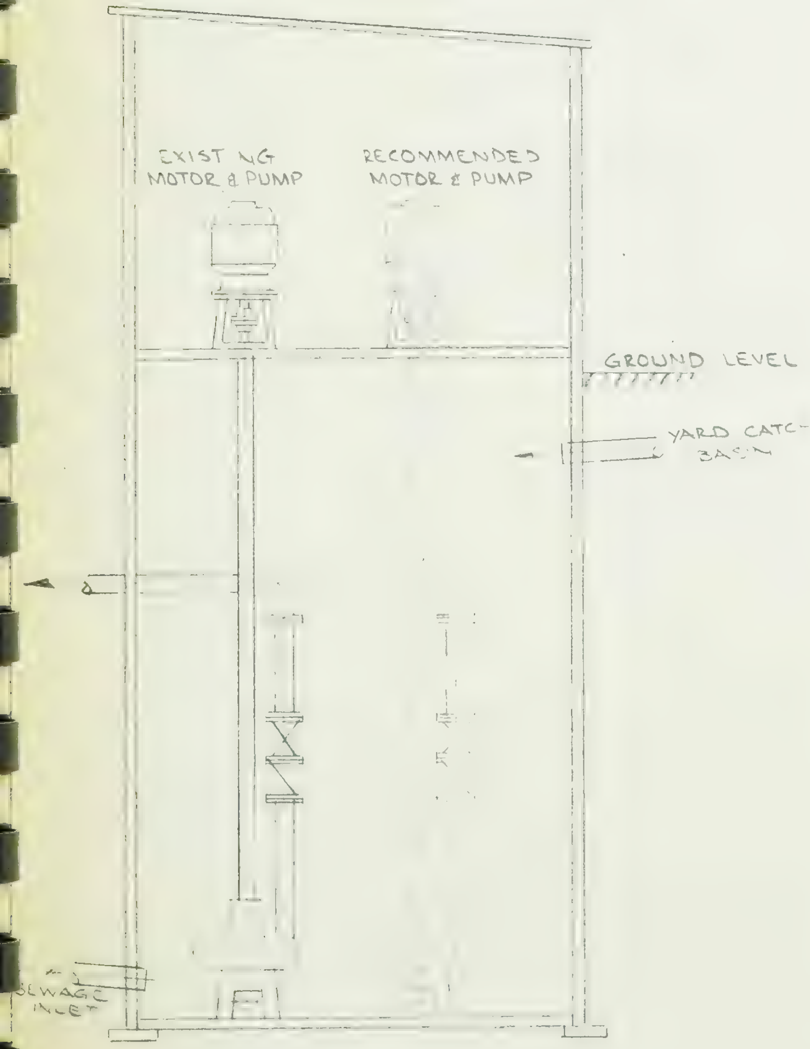

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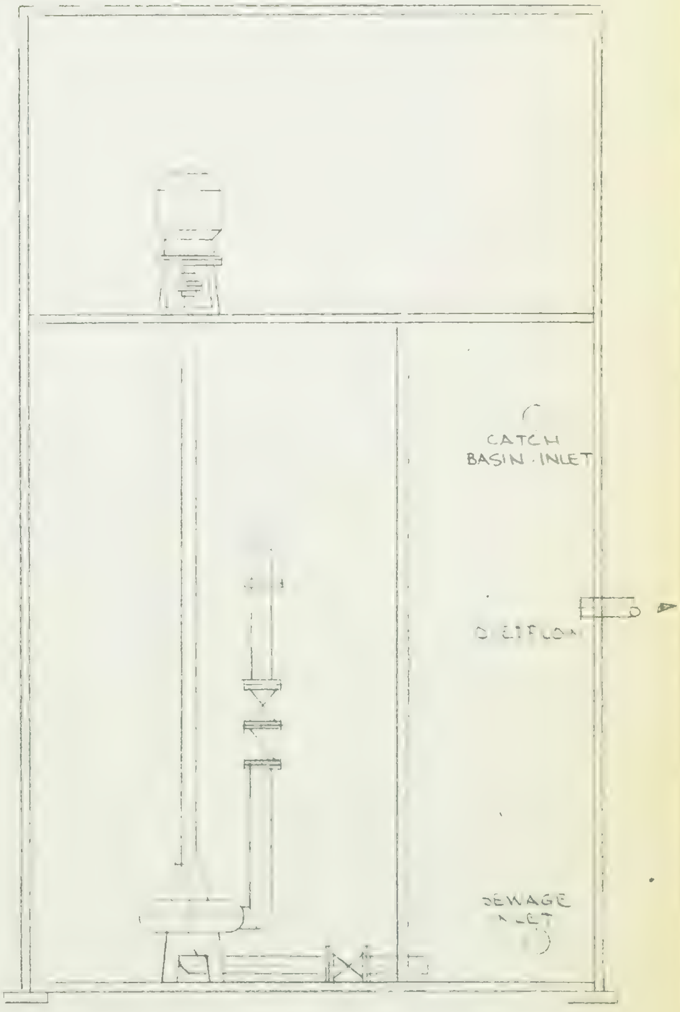


SECTION BB

TOWN OF DUNDAS
UNIVERSITY GARDENS
SEWAGE PUMPING STATION
UNDERWOOD McLELLAN & ASSOCIATES LTD.

1666-01

Dundanna Terrace Sewage Pumping Station:

Serviced Area: Approximately 225 persons.

Estimated peak dry weather sewage flow: 60 gpm.

Type of station:

The station is a pneumatic ejector type sewage pumping station, prefabricated steel structure - built in 1970.

Installed Equipment:

One 200 gal. pump chamber, two three h.p. compressors, rated at 60 gpm at a total dynamic head of 53 ft. It is a Smith & Loveless model, 9LH unit. The electrical supply to the station is 550 volt, 3 phase.

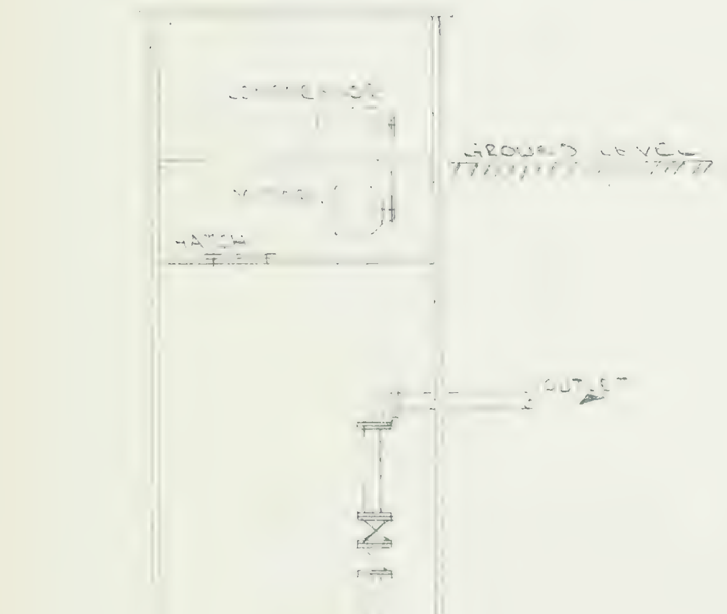
Forcemain:

One four inch diameter forcemain approximately 150 ft. long discharging to a sanitary sewer on Turnbull Road.

Hydraulic Conditions:

Static lift	41 ft.
Forcemain losses at 60 gpm	1 ft.
Station losses	5 ft.
Total dynamic head loss	47 ft.

The station is considered to be satisfactory, except for the installation of an alarm system and connections for a portable generator.



TOWN OF DUNDAS
DUNDANNA ESTATES
SEWAGE PUMPING STATION
UNDERWOOD McLELLAN & ASSOCIATES LTD

Creighton Road Sewage Pumping Station:

Serviced Area: 2,240 persons - original design.

Estimated dry weather peak sewage flow: 600 gpm.

Type of station:

Reinforced concrete underground structure with divided wet well and a dry well. Access to both wells is through manhole at ground surface. The station was built in 1964.

Installed Equipment:

One 400 gpm vertical Smart Turner sewage pump, 4x4, rated at 400 gpm at 80 ft. total dynamic head at 1,750 rpm powered by a 15 h.p., 550 volt, 3 phase General Electric electric motor.

One set of Davis electrode pump controls.
One forced air electric fan to vent the dry well.
One electric heater.
One dehumidifier.
One sump pump.

Forcemain:

One eight inch diameter forcemain approximately 1,170 ft. long discharging to a sanitary sewer at the intersection of Creighton Drive and Mayfair Crescent.

Hydraulic Conditions:

Static lift approximately	54'
Forcemain losses at 600 gpm	15'
Station losses	10'
Total dynamic head loss	79'

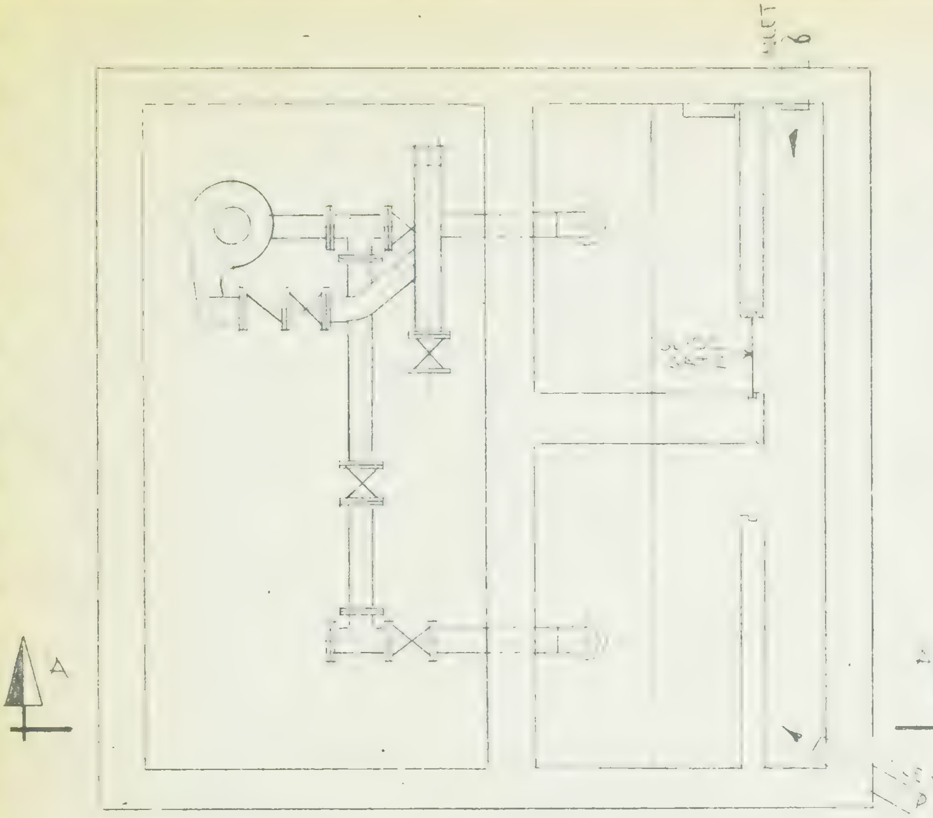
Pumps Required:

Two pumps each 600 gpm at 79' total dynamic head with 20 h.p. motor. Since service area is not fully developed a new pump of the recommended size is suggested with replacement of the existing pump when development warrants.

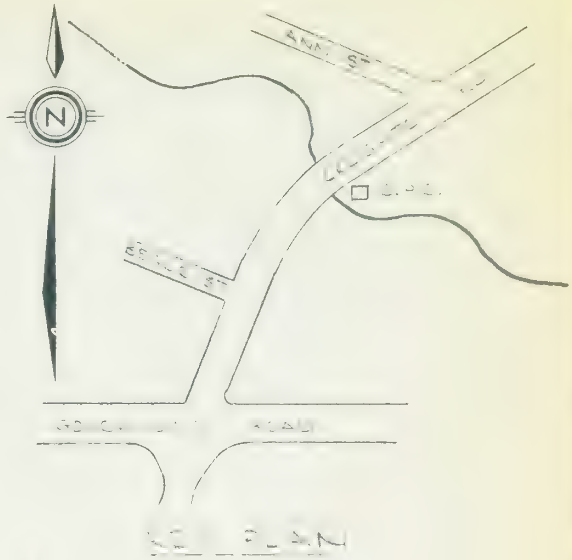
Other major equipment and modifications required:

One set of electrical controls for second pump, alarm system, standby diesel generator located in a small above ground enclosure, inspection of existing pump

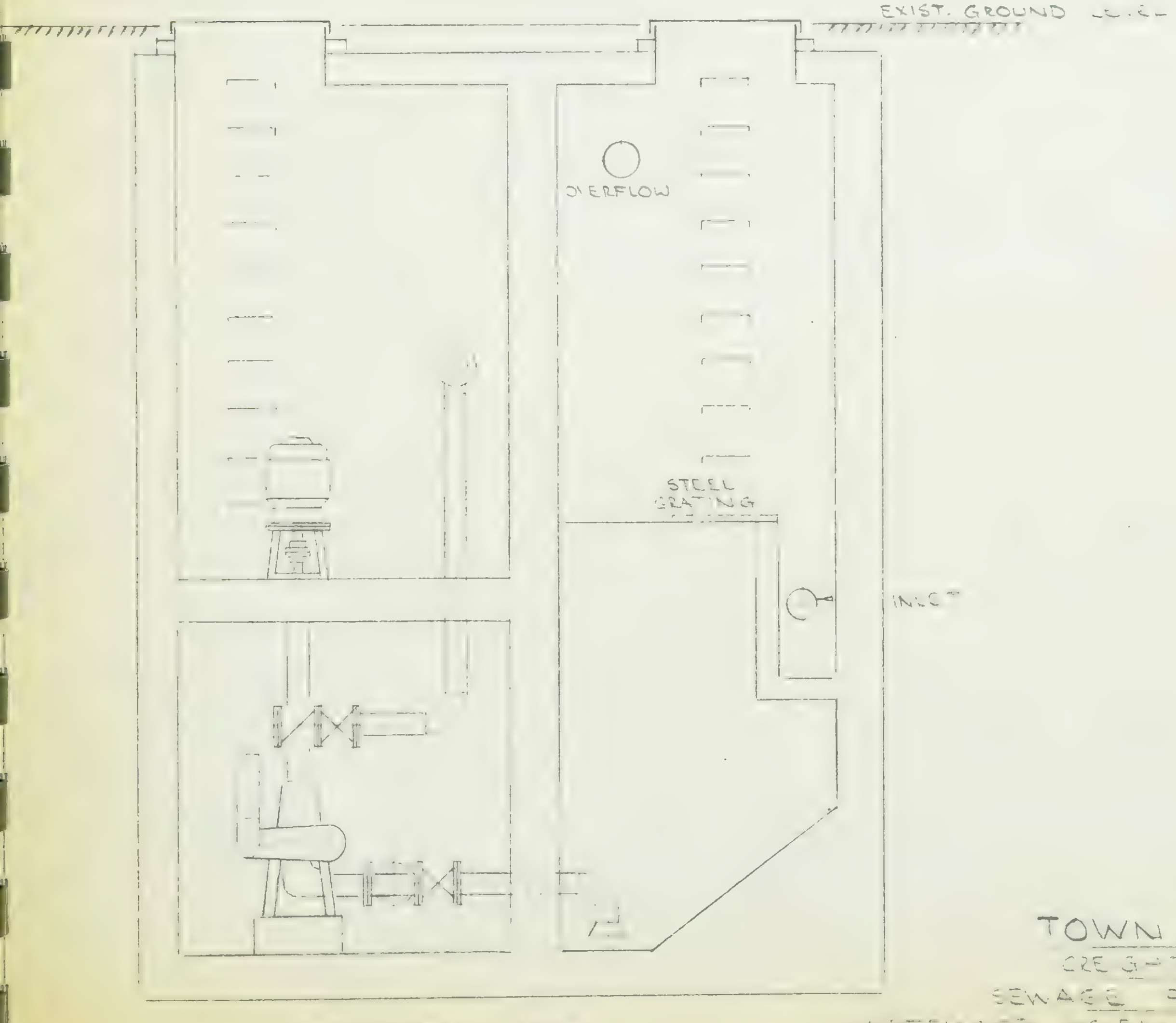
after new second pump is installed. Also ventilation in the wet well and water supply is required.



PLAN BELOW MOTOR ROOM



SITE PLAN



SECTION AA

TOWN OF DUNDAS
CREIGHTON ROAD
SEWAGE PUMPING STATION
UNDERWOOD McLELLAN & ASSOCIATES LTD.

Hillside Sewage Pumping Station:

Serviced Area: Approximately 1,400 persons.

Estimated peak dry weather flow: 400 gpm.

Type of station:

Reinforced concrete underground structure with divided wet wells and a dry well. Access to both wells is through manholes at the ground surface. The station was constructed in the 1950's.

Installed Equipment:

One vertical Smart Turner, 4x4, sewage pump rated at 450 gpm at a total dynamic head of 80 ft. at 1,725 rpm powered by a 15 h.p., 550 volt, 3 phase Robins-Meyers electric motor.

1 set of Davis electrode pump controls.
1 ventilation fan in the dry well.
1 sump pump.
1 dehumidifier.
1 electric heater.

Forcemain:

One eight inch forcemain approximately 1,050 ft. long discharging to a sanitary sewer on Hillside Avenue at Rowanwood Street.

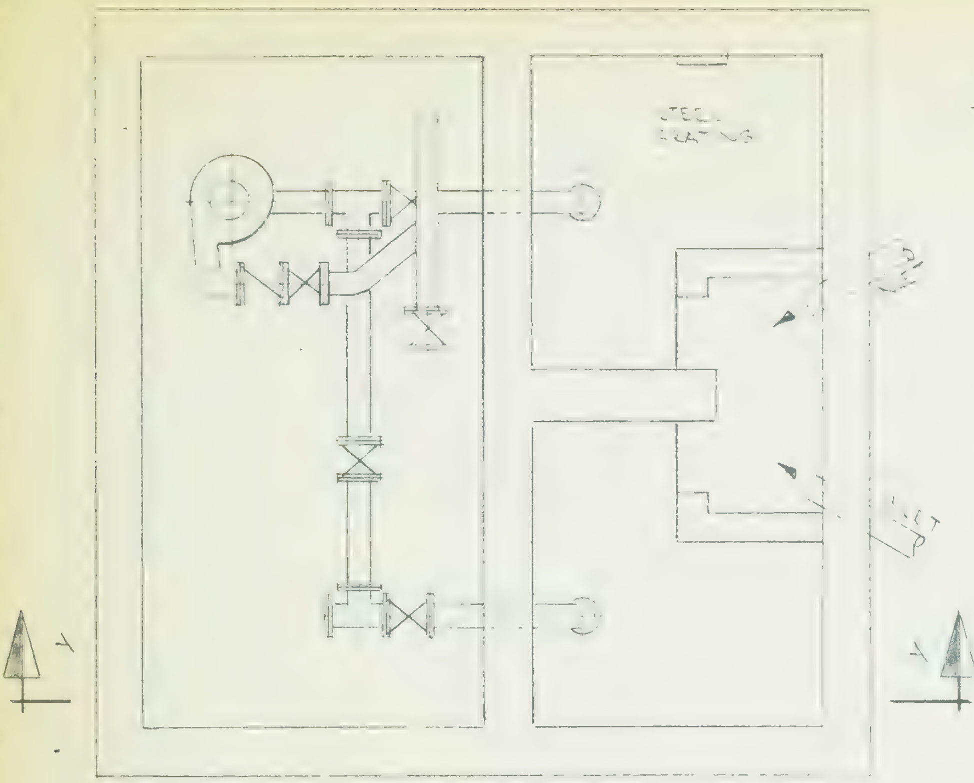
Hydraulic Condition:

Static lift approximately	60'
F.M. losses at 400 gpm	8'
Station losses	10'
Total dynamic head loss	88 ft.

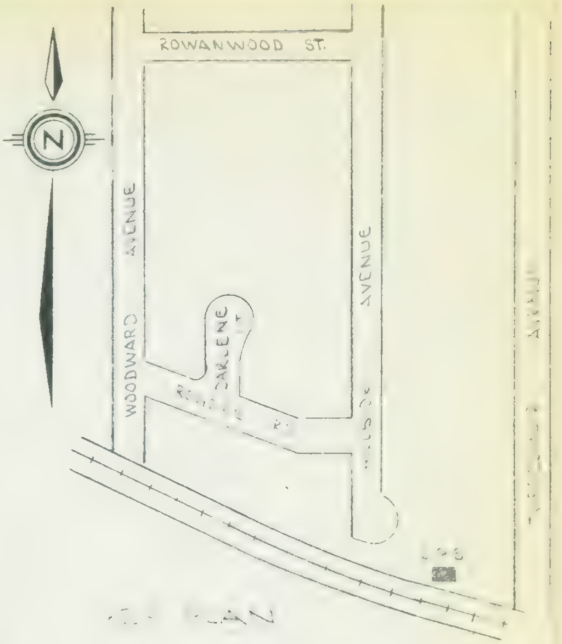
Pumps Required:

Two pumps each 400 gpm at a total dynamic head of 88 feet with 15 h.p. electric motors. The existing pump could be retained and a new second unit installed.

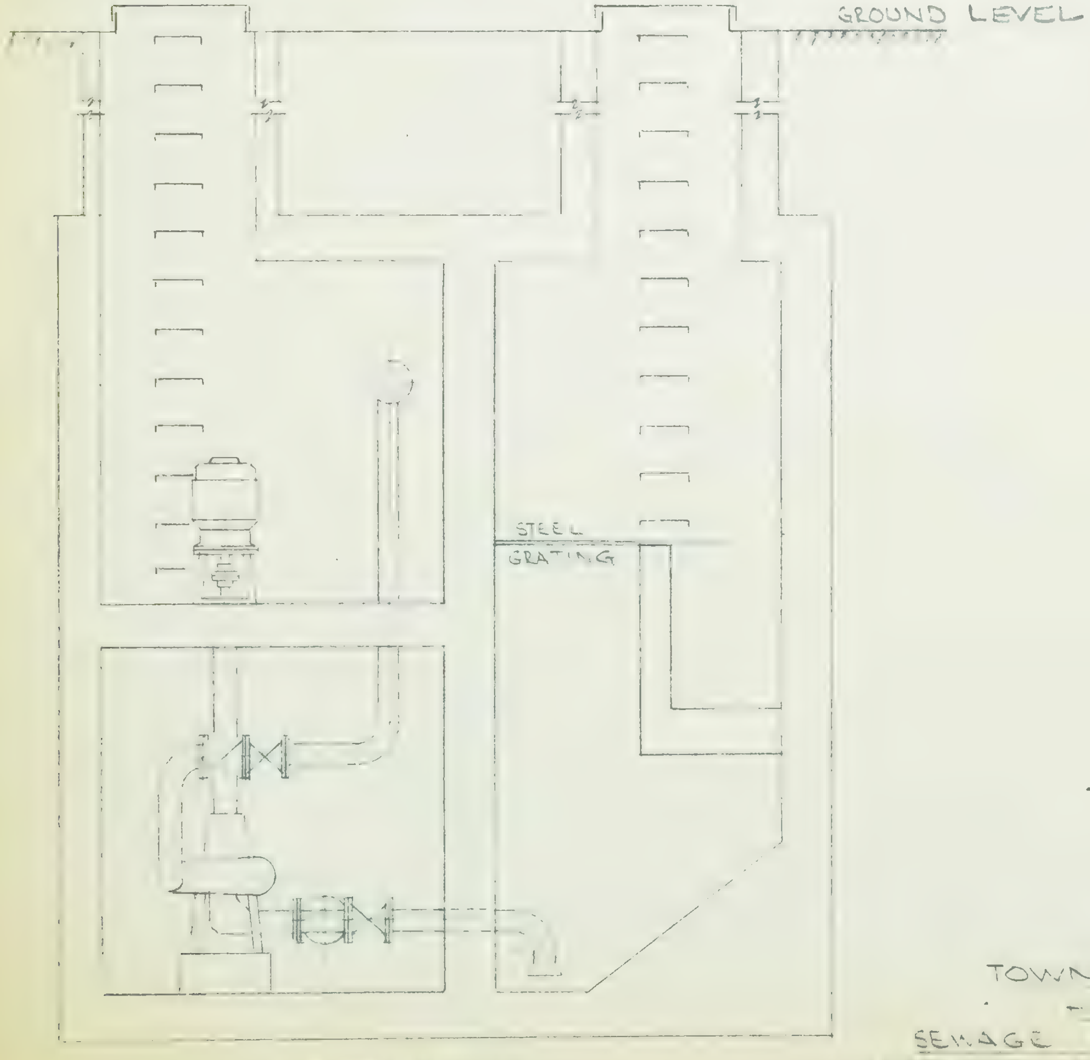
Other major equipment and modifications required: Additional electrical controls to accommodate the second pump, standby diesel generator located in a small above ground enclosure, alarm system, ventilation of wet well and water supply are required.



PLAN BELOW MOTOR ROOM



KEY PLAN



SECTION AA

TOWN OF DUNDAS
HILLSIDE
SEWAGE PUMPING STATION
UNDERWOOD McLELLAN & ASSOCIATES LTD.

16666-01

APPENDIX "B"

INDUSTRIAL WASTE BY-LAW

TOWN OF DUNDAS
BY-LAW NO. 2562-71

A BY-LAW TO CONTROL THE DISCHARGE OF SEWAGE INTO THE SEWAGE SYSTEM OF THE MUNICIPALITY PURSUANT TO PARAGRAPHS 69 and 125 OF SUBSECTION I OF SECTION 379 OF THE MUNICIPAL ACT, R.S.O. 1960, c. 249.

WHEREAS it is expedient to prohibit and regulate the discharge of domestic sewage and industrial wastes into drains, sewers, sewer systems and sewage works:

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF DUNDAS ENACTS AS FOLLOWS:

1. In this by-law,

    (a) "biochemical oxygen demand (B.O.D.)" means the quantity of oxygen utilized in the biochemical oxidation of organic matter in five (5) days at twenty (20) degrees centigrade as determined in accordance with Standard Methods and expressed in milligrams per litre;

(b) "coliform count" means the number of all coliform bacteria and expressed in number of coliform bacteria per 100 millilitres of solution, as determined in accordance with Standard Methods;

(c) "colour of a liquid" means the appearance of a liquid, from which the suspended solids have been removed, as determined in accordance with Standard Methods;

(d) "combined sewer" means a sewer intended to function simultaneously as a storm sewer and a sanitary sewer;

(e) "matter" includes any gaseous, liquid or solid matter;

(f) "Municipality" means the Corporation of the Town of Dundas;

(g) "person" includes a corporation, aggregate or sole;

(h) "pH" means the logarithm of the reciprocal of the concentration of hydrogen ions in grams per litre of solution;

(i) "phenolic compounds" means those hydroxy derivatives of benzene,or its condensed nuclei, which can be identified by the 4 - Aminoantipyrine method in accordance with Standard Methods, or the Gibbs procedures, as set out in the eleventh edition of Standard Methods for the Examination of Water and Wastewater;

(j) "sanitary sewer" means a sewer for the collection and transmission of domestic, commercial and industrial wastes or any of them;

(k) "sewage" includes drainage, storm water, commercial wastes, industrial wastes, and wastewater;

(l) "sewage works" means all sewers, sewer systems, sewage pumping stations, sewage treatment plants and other works for the collection, acceptance, transmission, treatment and disposal of sewage or for any one or more of them;

(m) "Standard Methods" means, unless the context otherwise requires, the methods and procedures set out in the edition of "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association and current at the time of any examination of any sewage;

(n) "storm sewer" means a sewer for the collection and transmission of storm water run-off, drainage or sewage derived from the draining of land or from a watercourse or any one or more of them;

(o) "suspended solids" means solid matter in or on a liquid, which matter is removable by filtering with a glass fibre filter paper equivalent to a Reeve Angel Glass Fibre Filter Paper, No. 934 AH.;

(p) "watercourse" means an open channel or ditch constructed as or resulting from the construction of municipal work in which a flow of storm water occurs either continuously or intermittently, including road ditches and including other natural depressions or watercourses draining into any such open channel or ditch whether connected to a storm sewer or not.

2. No person shall discharge, into land drainage works, private branch drains or connections to any sewer, sewer system or sewage works for the carrying away of domestic sewage or industrial wastes or both, which are connected directly or indirectly to the sewage system, any matter or quantity of matter which may be or become harmful to any sewage works or which may interfere with their proper operation, or which may impair or interfere with any sewage treatment process, or which may or may tend to obstruct any sewer, or which may be or may become a hazard to persons, property or animals, and, without limiting the generality of the foregoing, any of the following:

(a) sewage containing more than a total of 100 milligrams per litre of oil, fat and grease of animal and vegetable origin;

(b) sewage containing more than a total of 15 milligrams per litre of oil, grease and tar of mineral origin;

(c) sewage at a temperature in excess of 150 degrees fahrenheit;

(d) subject to subparagraph (b) hereof, flammable or explosive matter, and without limiting the generality of the foregoing, gasoline, benzene, naptha, fuel oil, acetone or other solvents;

(e) any quantity of matter capable of obstructing the flow in or interfering with the proper operation of any part of the sewage works, and without limiting the generality of the foregoing, any such quantity of ashes, cinders, garbage, sand, straw, mud, shavings, metal, glass, rags, feathers, plastic, wood or cellulose.

(f) sewage having a pH less than 5.5 or greater than 9.5 or which due ot its nature or content, becomes less than 5.5 or greater than 9.5 during transmission to a sewage treatment plant;

(g) sewage of which the B.O.D. exceeds 300 milligrams per litre;

(h) sewage in which suspended solids exceed 400 milligrams per litre;

(i) sewage that may cause a nuisance, and without limiting the generality of the foregoing, sewage containing hydrogen sulphide, carbon disulphide, ammonia, trichloroethylene, sulphur dioxide, formaldehyde, chlorine, bromine, or pyridine, in such quantity that

an offensive odour could emanate from the sewage works or could cause a nuisance;

(j) sewage containing animal waste, and without limiting the generality of the foregoing, containing intestines, stomach casings, intestinal contents, hides, hooves, toenails, horns, bones or poultry heads or sewage containing hair, wool, fur, feathers, paunch manure or fleshings in a quantity sufficient to interfere with the proper operation of the sewage works;

(k) sewage containing any of the following matter in excess of the indicated concentrations:

phenolic compounds -- .5 milligrams per litre

total cyanides, expressed as HCN -- 3 milligrams per litre

total sulphides, expressed as H_2S -- 3 milligrams per total

total copper, expressed as Cu -- 5 milligrams per litre

total chromium, expressed as Cr -- 5 milligrams per litre

total nickel, expressed as Ni -- 5 milligrams per litre

total lead, expressed as Pb -- 5 milligrams per litre

total zinc, expressed as Zn	-- 5	milligrams per litre
total cadmium, express as Cd	-- 5	milligrams per litre
chlorides, as Cl	-- 1500	milligrams per litre
sulphates, as SO_4	-- 1500	milligrams per litre

(l) radioactive materials except as may be permitted under The Atomic Energy Control Act R.S.C. 1952, chapter 11, and amendments thereto and regulations thereunder.

(m) storm run-off, sewage derived from the drainage of lands or roofs or water used for cooling purposes.

3. No person shall discharge, cause or permit the discharge or deposit into any land drainage works, drains or place draining to or connecting with any watercourse or storm sewer, any of the following:

(a) sewage at a temperature in excess of one hundred and fifty degrees fahrenheit (150 degrees F.);

(b) sewage containing more than a total of fifteen (15) milligrams per litre of fat, oil, grease and other matter which is soluble in ether;

(c) subject to subparagraph (b) hereof, flammable or explosive matter, and without limiting the generality of the foregoing, gasoline, benzene, naptha, fuel oil,

acetone or other solvents;

(d) any quantity of matter capable of obstructing the flow in or interfering with the proper operation of any part of the sewage works and without limiting the generality of the foregoing, any such quantity of ashes, cinders, garbage, sand, straw, mud, shavings, metal, glass, rags, feathers, plastics, wood, cellulose, tar, animal wastes or other matter that is not dissolved in a liquid at the time of its introduction into the sewage works;

(e) sewage containing any matter in a quantity or concentration that will or may cause the death of or injury of any person, property or animal;

(f) sewage having a pH less than 5.5 or greater than 9.5 or which due to its nature or content becomes less than 5.5 or greater than 9.5 during transmission through the sewage works;

(g) sewage in which suspended solids content exceed fifteen (15) milligrams per litre or sewage containing any suspended solids which are incapable of passing through a screen having openings not larger than one quarter (1/4) of an inch square;

(h) sewage that has or may cause an offensive odour, and without limiting the generality of the foregoing, sewage containing hydrogen sulphide, carbon disulphide, ammonia, trichloroethylene, sulphur dioxide, formal-

dehyde, chlorine, bromine, pyridine such quantity that an offensive odour could emanate from the sewage works or could cause a nuisance;

(i) sewage of which the B.O.D. exceeds fifteen (15) milligrams per litre;

(j) sewage containing coloured matter which sewage would require a dilution in excess of four (4) parts of distilled water to one (1) part of such sewage to produce a mixture the colour of which is not distinguishable from that of distilled water when tested in accordance with the Ontario Water Resources Commission Standard Laboratory Sewage Colour Determination Test;

(k) sewage containing toxic or poisonous matter in sufficient quantity to constitute a hazard to persons, property or animals, and, without limiting the generality of the foregoing, sewage containing any of the following matter in excess of the indicated concentrations:

Phenolic compounds	--	0.020	milligrams per litre
total cyanides, expressed as HCN	--	0.1	milligrams per litre
total cadmium, expressed ad Cd	--	1.0	milligrams per litre
total chromium, expressed as Cr	--	1.0	milligrams per litre

total copper, expressed as Cu	-- 1.0	milligrams per litre
total nickel, expressed as Ni	-- 1.0	milligrams per litre
total zinc, expressed as Zn	-- 1.0	milligrams per litre
total iron, expressed as Fe	-- 17.0	milligrams per litre
chlorides, as Cl	--1500	milligrams per litre
sulphates, as SO_4	--1500	milligrams per litre

(l) sewage in which the coliform count exceeds two thousand four hundred (2400) per one hundred (100) millilitres as determined by Standard Methods;

(m) radioactive materials except as may be permitted under The Atomic Energy Control Act, R.S.C. 1952 chapter 11, and amendments thereto and regulations thereunder.

4. Except as otherwise specifically provided in this by-law all tests, measurements, analyses and examinations of sewage, its characteristics or contents shall be carried out in accordance with Standard Methods.

5. The Town Engineer and the other duly authorized employees of the Town bearing proper credentials and

indentification shall be permitted to enter upon all properties for the purpose of inspection, observation, measurement, sampling and testing, in accordance with the provisions of this by-law.

6. The discharge of sewage that would otherwise be prohibited by this by-law may be permitted to an extent fixed by agreement with the Municipality under such conditions with respect to payment or otherwise as may be necessary to compensate for any additional costs of treatment. (Any such agreement shall be subject to the approval of the Ontario Water Resources Commission.)

7. Every person who contravens any provision of this by-law shall upon conviction thereof, forfeit and pay, at the discretion of the convicting magistrate, a penalty (exclusive of costs) not exceeding Three Hundred Dollars ($300.00) for each offence. Each day in which any such contravention occurs shall be deemed to be a separate offence. Such penalties shall be recoverable under the provisions of The Summary Convictions Act.

Passed this ________________ day of __________________ A.D. 1971

____
MAYOR

____
CLERK

APPENDIX "C"

DESIGN PARAMETERS FOR PROPOSED CONVENTIONAL ACTIVATED SLUDGE PROCESS

Flow:

Avg. 2.5 mgd.

Peak, 2.0 x 2.5 mgd. = 5.0 mgd., plus waste activated sludge produced by an adjacent 1.5 mgd. conventional activated sludge plant.

Sludge loading attributed to the existing plant should affect only the quantity of sludge to be removed from new primary settling tank.

Strength:

Raw Sewage BOD - 180 ppm.
S.S. - 180 ppm.

Primary Treatment Effluent - BOD - 30%
- S.S.- 50%

Overall Plant Effluent - BOD - 92%
- S.S.- 92%

Inlet Works:

Junction chamber to be built on the existing plant by-pass. Sewer to be equipped with a weir to direct all sewage flows up to 5.0 mgd. to the new plant for treatment.

Existing junction chamber to be modified through the installation of adjustable weirs to provide flow control through the existing plant between 1.5 and 4.0 mgd.

Screen and Grit Tank:

A communitor and by-pass raw sewage bar screen channel to be provided, (integral with the new grit removal tanks) sized for a peak flow of 5.0 mgd.

Grit Tank:

Aerated grit tank to be provided with grit settling dewatering hopper. The grit will be lifted by an air lift pump to the dewatering hopper.

Retention time - 5 min. at D.W.F.

2.5 mgd. = 8,700 gal.

= 1,400 cu.ft.

Average water depth - 10'

Tank area,12' x 12' = 144 sq. ft.

Volume provided,1,440 cu.ft.

Retention time = 5.1 min.

Air supply, 75 cfm., provided by two similar blowers in the new sludge pump building; one is standby.

Primary Settling Tank:

Peak flow rate - 5.0 mgd. raw sewage
- .25 mgd. waste activated sludge from existing plant.

Total peak flow,5.25 mgd.

Maximum settling rate,1,500 gpd/sq.ft.

Surface area required - 3,500 sq.ft.

Water depth - 11'

Volume provided - 38,500 cu.ft.
- 240,000 gal.

Retention Time:

at 2.5 mgd. - 140 min.

at 5.25 mgd. - 66 min.

Basic dimensions, 40' W. x 88' L. x 11' S.W.D.

Actual tank,40' x 88' x 12.5' equipped with single bladed bridge sludge collector which travels on rails located in the tank walls with cog wheel and drive rail. Flight type cross sludge collector is provided to deliver sludge to sludge hopper located adjacent to the sludge pump

building. The scum skimmer is integral with the bridge sludge scraper and the scum is collected in a scum hopper located on the outside of the north wall. The scum is pumped by the raw sludge pumps.

Effluent weir length is 96 ft.

Weir overflow rate at 2.5 mgd. is 26,000 gpd./ft.
at 5.25 mgd. is 54,700 gpd./ft.

Aeration Tank:

Primary effluent BOD = 180 - (0.3 x 180) = 126 ppm.

At 2.5 mgd. BOD load to the aeration tank = 3,150 lbs/day.

Design BOD loading is 40 lbs./1000 cu.ft.

Required tank size = 78,700 cu.ft.
= 490,000 gal.

Retention time at 2.5 mgd. = 4.73 hr.
at 5.0 mgd. = 2.37 hr.

Tank dimensions 85' x 85' x 13' D.

Actual retention time,4.77 hr.

A 75 h.p. mechanical surface aerator pedestal mounted with access catwalk or bridge mounted is provided. Assuming an oxygen requirement of 1.5 lbs./lb. BOD, the total air required = 4,720 lbs./day. The aerator is capable of providing 5,400 lbs. per day.

Final Settling Tank:

Design basis, 830 gpd/sq.ft. of surface area at 5.0 mgd.

Area required - 6,030 sq.ft.

Water depth - 11'

Volume of tank = 66,200 cu.ft.

= 413,000 gal.

Retention time at 2.5 mgd. = 4.0 hr.

at 5.0 mgd. = 2.0 hr.

Chain flight type sludge collector provided with sludge cross collectors.

Tank dimensions - 41' W. x 150' L. x 13.5' D.

Actual retention time - 4.05 hr. at 2.5 mgd.

Chlorine Tank:

Design basis, 30 min. at 2.5 mgd.

Required tank volume,51,900 gal. (8,300 cu.ft.)

Tank dimensions, 40' L. x 24' W. x 13.5 D. Actual retention time (40 x 24 x 8.75) = 32 min. at 2.5 mgd. Baffles are provided to control the flow pattern in the tank.

Sludge Pumps:

2 - raw sludge pumps are required, each designated for full requirements; one is standby.

Due to use of alum for nutrient removal, a sludge with lower solids content is expected.

On the basis that a sludge concentration of 2% will be achieved:

50% removal raw suspended solids = 2,250 lbs./day.

Waste activated sludge, 0.5 lbs./lb. of BOD, 2,775

Alum, 6,000

Total Solids 11,025 lbs./day

at 2% solid content, the liquid sludge volume is

$11,025 \times \left(\frac{100}{.02}\right) = 55,125$ gpd

$$\frac{11,025}{0.02 \times 10} = 55,000 \text{ gpd.}$$

55,1250

therefore, 2 pumps, each 40 gpm, are required.

Recirculation Pumps:

Require pumping capacity capable of pumping between 25% and 100% of raw sewage flow.

Provide two pumps each capable of 900 gpm equipped with variable speed drives to provide a minimum pumping capacity of 450 gpm each.